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The Farm Wage and Land Market Situation under Comilla Cooperative Programme

by

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Under the present social set-up in Bangladesh, the role of the Comilla cooperative programme in augmenting farm supply and thus bringing about prosperity to owner farmers has largely dominated over its role in promoting equity. This is reflected in the low participation of poor farmers in the programme as well as in falling real wage to farm workers and fast rising income and wealth gains to land owners due to increase in productivity, rent and price of farm land. Thus, the scope of the Comilla cooperative programme is reduced to that of other Government programmes for modernizing agriculture by strengthening the input supply system through larger private sector participation. Available data do not indicate that the process of concentration of land ownership and polarization among peasantry through land transfer is a specific phenomenon for the areas with Comilla-type cooperative programme. It is rather a concomitant feature of pauperization in Bangladesh peasantry as a whole. Appropriate Government action may be taken to correct the undemocratic functional mechanism of the Comilla cooperative programme to ensure the full-fledged participation of the poor farmers. This may be also supplemented by policies towards agricultural wage and rent reforms in order to ensure a steady growth in the income of farm workers and poor tenants in accordance with changing production possibilities.

I. INTRODUCTION

The main purpose of this paper is to focus on the influence of the Comilla cooperative programme on the farm wage and land market situation in Bangladesh with the help of field data collected from some selected areas in Comilla district in 1982. The principal hypothesis it will try to test is that under the existing social set-up in rural Bangladesh, which is characterized by feudal as well as rudimentary type of capitalistic relations, the Comilla-type cooperatives are not able to play a socially neutral role in the development of employment, farm wage and market for farm land.

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Although the merits of the Comilla programme for Bangladesh have been contradiction in many studies (e.g., Khan, 1979; Abdullah, *et al.* 1976), relatively little empirical information is available regarding the socio-economic imbalances created by it. The few available studies in this regard deal mainly with the low participation of the poor farmers, and the discussion on the extent of productivity increage (per acre) for the small *vis-a-vis* large farms in this programme is inconclusive due to inadequacy of data or clarity in the results of their analysis (Malek, 1976; Khan, 1979). Setting aside the impact of farm size of the participants (assuming that the inputs made available under the Comilla programme are mostly scale-neutral) this paper will try to focus particularly on such aspects of income and wealth distribution as employment, wage, land price and land rent, and thus try to identify the shares of the benefits accruing to owner farmers, poor tenants and landless labouress.

II. DATA AND METHODOLOGY

In order to determine the effect of the cooperative programme the paper proposes an intertemporal (before-after) comparison as well as an interregional (with-without) comparison of an area under cooperative programme with two other areas, one with similar input supply and technical facilities through open market commercial channel as in the area under cooperative programme and the other, a traditional village without such facilities. Three farm samples, one for each of the above programme variables, were selected from three areas of Comilla district by using purposive method in order that the average farm area owned in 1981 was about the same for all of the samples. The average farm area owned in 1981 varied from 1.94 acres to 2.03 acres in the selected areas, the variations being statistically not significant at 0.01 level (Table I). The average farm size of the samples approximately corresponds to that of the medium size farms of the respective areas.

The sample under cooperative programme consists of 46 members of a cooperative society in the village Joypur under Comilla Kotwali Thana which was established in 1972 and supplies its members with modern inputs like irrigation water, fertilizer, insecticide (in the beginning also HYV seeds) as well as credit, equipment service and farm extension.

A second sample of 50 farms were drawn from village Sreemantapur in Chandina Thana which is covered by the government programme of strengthening private commercial channel of fertilizer sale. The programme was

introduced in 1978 although the private channel for fertilizer sale existed even before that. Besides, there are privately owned irrigation sets in this area and insecticides are also supplied entirely through private traders. The third sample of 50 farms were taken from Dingirpara, a traditional village in Daudkandi Thana. The farmers of this village had no access to institutional sources of inputs. The nearest private sources were six to seven miles away and were not linked by road communication.

TABLE I

CHANGES IN OWNED AND CULTIVATED AREA PER FARM

Information	Cooperative Programme (n=46)	Open Market Programme (n=50)	Traditional Village (n=50)
		.....acres.....	
Current Year (1981)			
Own cultivable area[a]	1.94	2.00	2.03
Own cultivable area per family member	0.23	0.25	0.26
Operated area[b]	2.02	1.86	2.04
Operated area per family member	0.24	0.23	0.26
Base/Pre-programme[c] Year (1972 or 1977)			
Own cultivable area	1.77	2.05	2.14
Own cultivable area per family member	0.27	0.30	0.31
Operated area[b]	1.68	1.91	2.19
Operated area per family member	0.26	0.28	0.32

a. T-test indicates no significant mean difference between programme areas at 0.01 level.

b. Operated area=own area+area rented in+area mortgaged in—area rented out—area mortgaged out.

c. Base year for the area under open market programme is 1977. For details see Section II of this paper.

Source; Field survey.

Intertemporal comparisons across the three samples have been rendered a little difficult since the base period for the scond sample was 1977[1] the year before launching the government drive for strengthening private trade in fertilizer in this area, while that of the other two areas was 1972. This should be remembered while going through the following analysis. The years used in the intertemporal comparisons were by and large normal in respect of agroclimatic factors so that the data provided by the farmers may be assumed to contain no significant seasonal or climatic bias.

III. THE DISTRIBUTIVE CONSEQUENCES

It is now generally acknowledged that the productivity improvements under the Comilla approach benefitted mostly the medium and large farmers mainly due to the structural and organizational barriers against entry possibilities of landless and poor families in the cooperatives (see e.g., Akhtar, 1974; Abdullah *et al.* 1976; Ahmed, 1977). It was hypothesized by the founders of the Comilla approach that the just share of the poor and landless families in the ensuing prosperity would be automatically guaranteed by a "trickle down" process through increased employment higher wage and cheaper foodgrains. An attempt will be made in this Section to test this hypothesis by comparing the employment and wage gains to the poor and landless families against rural cost of living index as well as gains to peasant proprietors through developments in land price and land rent in the selected areas.

Employment and Wage Gains

An analysis of employment generation is difficult due to : 1) unstandardized employment data (male-female, child-adult, household-farm work), 2) difficulties in accepting quantity of labour as a sufficient measure of employment generation in the absence of accurate data on its marginal productivity and 3) absence of record keeping by farmers. The employment data presented in this Section were collected by close observation of the sample farms for about five months but still largely depending on memories of farmers. The data which were standardized into male adult units (= 2 non-adult or 1.5 female adult units) relate to only farm work.

[1] Private wholesaling of fertilizer at the Thana level without direct government supervision was introduced in selected areas of Bangladesh in 1978. That is why an area with longer history of massive fertilizer sale by private traders could not be found.

The data in Table II reveal that the volume of labour available and used per household increased considerably in the two areas under cooperative and open market programmes during the period under study. Although own family labour was the major source of increase in the labour employment in these two areas, hired labour use per farm increased significantly only in the cooperative area. This was due to the off-farm works preferred by the family members of this area. Despite increased availability of family labour the use of labour per farm remained almost constant in the traditional village. But the use of hired labour decreased considerably in this area.

TABLE II

AVAILABILITY AND USE OF FARM LABOUR PER HOUSEHOLD PER YEAR

Kind of Labour	Cooperative Programme		Open Market Programme		Traditional Village	
	1981	1972	1981	1977	1981	1972
Availability :						
Own man-units	1.21	0.85	1.43	1.20	1.08	0.78
Hired man-days	176	105	159	141	87	109
Total man-days I[a]	466	309	502	429	346	296
Total man-days II[b]	539	360	588	501	411	343
Use :						
Own man-days	238	182	308	254	206	183
Hired man-days	176	105	159	141	87	109
Total man-days	414	287	467	395	293	292
Balance (Availability-use) :						
Estimate I[a]	52	22	35	34	53	4
Estimate II[b]	125	73	121	106	118	51
Proportion of Hired Labour in Total Available Labour :						
Estimate I[a]	38	33	32	33	25	37
Estimate II[b]	33	29	27	28	21	32
Proportion of Hired Labour in Total Labour Used :	43	37	34	36	30	37

a. Estimate based on 240 man-days per man-year.

b. Estimate based on 300 man-days per man-year.

Source : Field survey.

If the employment data are computed in terms of man-days per acre of total cropped area the differences in the increase of total labour use between the areas become less significant (Table III). This shows that the increase in cropping frequency due to irrigation water and quick-maturing HYV rice was the major source of employment expansion in the areas under cooperative programme and open market programme.

During the period between 1972 and 1981 the use of hired labour per-farm increased by 68 per cent in the area under cooperative programme but it decreased by 20 per cent in the traditional village. In the area under open market programme the use of hired labour increased by 12 per cent during the period between 1977 and 1981. Here also the extent of change decreases if one considers the employment of hired labour in terms of man-days per acre of cropped area. A common feature regarding the change of composition of

TABLE III

INDEX OF LABOUR USE FOR 1981

Kind of Labour Unit	Cooperative Programme	Open Market Programme	Traditional Village
	1972=100	1977=100	1972=100
Per Farm :			
Own	131	121	113
Hired	168	112	80
Total	144	118	100
Per Owned Acre :			
Own	119	124	118
Hired	154	116	84
Total	132	121	106
Per Operated Acre :			
Own	109	125	121
Hired	138	115	86
Total	120	121	108
Per Acre of Total Cropped Area :			
Own	102	117	123
Hired	131	110	86
Total	113	115	111

Source : Field survey.

hired labour in all of the areas is that the employment of permanent labour went down considerably during the period under consideration (Table IV) which may be attributed to the mounting unemployment or under-employment of the fixed family labour in the sample farms.

During the field survey it could be gathered from the farmers that mainly five factors worked behind the substantial increase of hired laboure use in the area under cooperative programme. Firstly, many young family members of the farmers migrated to towns and industrial areas. This is true particularly for a large number of youth who received mechanical training at the workshop of the Thana Central Cooperative Association primarily for operating and

TABLE IV

PATTERN OF HIRED LABOUR USE IN MAN-DAYS PER YEAR

Programme Area	Casual Labour Hired			Permanent Labour Hired			Total Labour Hired		
	1981	1972	(77)	1981	1972	(77)	1981	1972	(77)
				Man-days per Farm					
Cooperative programme	140	51		36	54		176	105	
							(21)	(51)	
Open market programme	109	82		50	59		159	141	
							(31)	(42)	
Traditional village	52	53		35	56		87	109	
							(40)	(51)	
				Man-days per Owned Acre					
Cooperative programme	72	29		19	31		91	60	
Open market programme	55	40		25	29		80	69	
Traditional village	26	25		17	26		43	51	
				Man-days per Operated Acre					
Cooperative programme	69	30		18	32		87	62	
Open market programme	59	43		27	31		86	74	
Traditional village	25	24		17	26		42	50	
				Man-days per Acre of Total Cropped Area[a]					
Cooperative programme	36	17		9	18		46	35	
Open market programme	31	24		14	17		45	41	
Traditional village	15	14		10	15		25	29	

Figures in parentheses indicate per cent share of permanent hired labour in total hired labour.

a. Number of crops raised per acre × operated area.

Source : Field survey.

servicing agricultural machinery such as irrigation set, tiller, etc. but later used this training for getting jobs in urban areas. Secondly, the availability of migrant labourers during peak periods made it possible to employ more casual labour and let own family labour go off for urban employment. Thirdly, due to the massive credit programme of the cooperative many member farmers had adequate cash money to employ purchased inputs including hired labour. Fourthly, with the gradual improvement of the economic condition of this area many well-to-do farmers preferred managerial work to manual labour. Fifthly, with the increase in land productivity many cooperative members increased their operated area (Table I) by renting-in and thus required more hired labour. Obviously, the former tenants who have been now displaced by the cooperative members are to sell wage labour instead of operating as tenants. This amounts to a process of transforming tenants into wage earners.

But a mere rise in the volume of hired labour can not ensure an increase in the real income of the farm workers. The increase of hired labour use may also raise the degree of inequality in income distribution unless the rise in wage is in proportion with that of living costs and various sources of farm income to the employers of wage labour. However, in the absence of data on changes in real farm income we propose to analyse the question of equity in income distribution by comparing the trends of farm wage against that of rural cost of living, land price and land rent.

Table V shows the change of farm wage, land rent, mortgage rate and land price in real terms for different periods in the study areas assuming 15 per cent inflation. An alternative calculation of these changes has been presented in Table VI assuming 20 per cent inflation which seems to be more realistic (Compare data from BBS 1981). Both of these Table indicate a falling real wage and sharply rising real price and rent of land between 1972 and 1981 in area under cooperative programme and between 1977 and 1981 in the area under open market programme. In the traditional village, all of these indicators registered a decline between 1972 and 1981 except land price under the assumption of 15 per cent inflation. A comparison accross the different areas makes it clear that under the cooperative programme and open market programme, the improvement of agricultural production could not ensure equitable rise in farm wage. On the other hand, due to potentials for increased production and, therefore, higher income, land price and land rent in real terms increased substantially in these areas during the period under study.[2] Scarcity of land and

[2] The effect of Middle East remittance on land market was eliminated by choosing areas without Middle East remittance.

deteriorating land/man ratio certainly played an important role in this regard. But if one compares the three areas it becomes evident that the input supply facilities and the related agricultural modernization played the major role in increasing land rent and land price in the development programme areas.

TABLE V

DEVELOPMENT OF CASH RENT, MORTGAGE RATE, LAND PRICE AND FARM WAGE IN TAKA IN THE PROGRAMME AREAS

Programme Area/ Rent/Price/Wage	Nominal 1972 (77)	Nominal 1981	Real 1981 i.e.,Deflated to 1972 (77) (a)	Nominal 1981 as % of 1972 (77)	Real 1981 as % of 1972 (77)
Cooperative Programme					
Cash rent/acre	540	2 842	808	526	150
Mortgage rate/acre	9 232	26 391	7 503	286	81
Land price/acre	26 000	160 000	45 482	615	175
Wage/man-day[b]	8.59	24.87	7.07	290	82
Open Market Programme[c]					
Cash rent/acre	647	1 443	825	223	128
Mortgage rate/acre	13 350	21 644	12 376	162	93
Land price/acre	55 362	119 860	68 536	216	124
Wage/man-day[b]	10.75	13.50	7.72	126	72
Traditional Village					
Cash rent/acre	478	1 505	428	315	90
Mortgage rate/acre	5 650	16 900	4 804	299	85
Land price/acre	20 880	80 240	22 809	384	109
Wage/man-day[b]	4.25	12.50	3.55	294	84

a. By the inverse factor based on 15% inflation annually.
b. Wage rate without meal, average for major operations.
c. The base year for this area is 1977.

Source : Field survey.

The higher initial level of farm wage in the cooperative area may be due to increase in farm employment as well as to growth of residential areas and various development activities in the neighbouring BARD campus. Also to be considered in this regard is the huge influx of farm credit in this area which may have caused some inflationary pressure upon the wage rate. The initial

TABLE VI

AN ALTERNATIVE COMPUTATION OF TABLE V BASED ON 20% INFLATION

Programme/Area Rent/Price/Wage	Real 1681, i.e., Deflated to 1972 (77) at 20% Inflation Rate Annually[a]	Real 1981 as % of 1972 (77)
	— Taka —	
Cooperative Programme :		
Cash rent /acre	551	102
Mortgage rate/acre	5 115	55
Land price/acre	31 009	119
Wage/man-day[b]	4.82	56
Open Market Programme[c] :		
Cash rent/acre	696	108
Mortgage rate/acre	10 437	78
Land price/acre	57 797	104
Wage/man-day[b]	6.51	61
Traditional Village :		
Cash rent/acre	292	61
Mortgage rate/acre	3 275	58
Land price/acre	15 550	75
Wage/man-day[b]	2.42	57

a. By using the inverse factor. b, c. See footnotes b and c of Table V.

Source : Based on Table V.

wage (1972) in the cooperative area was about twice that of the traditional village. But the rise in the wage level between 1972 and 1981 was not at par with inflation rate so that real wage in both of the areas fell to 82 per cent and 84 per cent respectively considering 15 per cent inflation rate and to 56 per cent and 57 per cent respectively considering a 20 per cent inflation rate. If we assume a lower inflation rate for the traditional village in comparison with that of the areas under cooperative programme and open market programme the rate of decline in real wage in these areas will be comparatively still higher compared to that of the traditional village.

Let us now compare the pattern of farm wage movement in the selected study areas with the general trend in Comilla district and Bangladesh as a whole. The data in Table VII indicate a simillar falling trend of real wage in Comilla district and Bangladesh as in the selected study areas. Both in Comilla

district and Bangladesh as a whole money wage increased roughly three times while the rural cost of living index (CLI) for Bangladesh increased about four and a half times during the period between 1972/73 and 1980/81. Thus in both cases the real wage fell in an almost similar pattern and magnitude.

On conclusion, it appears that in the area under cooperative programme, as in other areas of Bangladesh, with or without development programme, real farm wage declined in the long-run. Thus the hypothesis that Comilla approach would ensure agricultural growth with equitable income improvements to landless labourers does not seem to hold valid. In so far as the Comilla approach is neither able to attract the landless households to join the cooperatives nor help increase their wage earnings through "trickle-down" effect there remains very little scope to speak of its equitative role.

TABLE VII

AGRICULTURAL WAGE AND RURAL COST OF LIVING IN COMILLA DISTRICT AND BANGLADESH

Year	Agricultural Wage in Comilla				Agricultural Wage in Bangladesh				
	Money Wage	Real Wage[a]	Index of Money Wage	Index of Real Wage	Money Wage	Real Wage[a]	Index of Money Wage	Index of Real Wage	Rural CLI[b]
	(Taka)		(1972/73=100)		(Taka)		(1972/73=100)		
1972/73	5.23	(5.23)	100	(100)	4.76	(4.76)	100	(100)	100
1973/74	6.51	3.88	124	74	6.69	3.98	141	84	168
1974/75	10.14	4.17	194	80	9.05	3.72	190	78	243
1975/76	9.42	3.75	180	72	8.82	3.51	185	74	251
1976/77	8.96	3.23	171	62	8.93	3.22	188	68	277
1977/78	8.67	3.19	165	61	9.44	3.47	198	73	272
1978/79	12.42	3.74	237	72	10.88	3.28	229	69	332
1979/80	14.75	3.71	282	71	12.46	3.13	262	66	398
1980/81	15.25	3.40	292	65	14.62	3.26	307	68	449

a. Real wage has been computed by deflating money wage by inverse factor derived from current year's CLI.

b. Average of selected districts, computed after BBS, 1981 and Clay and Khan, 1977.

Source: BBS 1981, Clay and Khan, 1977 and own computation.

Land Price and Land Rent Vs. Farm Wage

We have already seen from Tables V and VI that price of farm land in real terms increased substantially in the areas under cooperative programme and open market programme. But in the traditional village price of farm land fell in real terms. Thus, it is evident that the development programmes helped the land owners get an unearned income benefit *vis-a-vis* the landless as well as land owners in areas without development programme. There may be two explanations to this situation which are, however, interrelated. Firstly, irrigation schemes and other modernization programmes increased the quality of land by expanding the cropping frequency and yields in the areas with development programmes. Secondly, improvement of production and farm income might have also created a higher demand for buying land particularly amongst the medium and large farmers (discussed in details in Section IV).

The rise in the rental rates in real terms in the areas under cooperative programme and open market programme (Tables V and VI) means an increase in the production cost to tenants and hence a reduction in their income. On the contrary this also indicates increased income to landlords. In order to examine the pattern of income distribution between landlords and tenants one must, however, look at the cost/return relations for both of these groups. In the absence of such data we can make theoretical observations.

Since supply of land in Bangladesh in highly inelastic and that of labour very elastic due to abundance and interregional migration the landlords, most of whom are part-operators, have a clear competitive advantage over the land-poor and landless with regard to bargaining for land rent and wage. When agricultural development occurs and farm income increases, the demand for land and labour also increases (since the development programmes under consideration are mostly labour intensive). So, landlords and peasant farmers choose between alternative profitabilities from 1) increasing their own cultivated area by using more hired labour and 2) renting out surplus land to tenants. The land-poor and landless also consider alternative profitabilities from 1) selling their surplus labour as wage earner or 2) operating as tenants. Under these circumstances the terms of trade are dictated by the owners of land, the scarce factor with inelastic supply (see Binswanger, 1978).

This may be graphically illustrated [Figure 1 (a) and (b)]. SL represents supply curve for land which is highly inelastic. SW represents supply curve for wage labour which is very elastic. For the sake of simplicity we assume a straight line as labour supply curve. In the wake of green revolution the

INFLUENCE OF LAND AND LABOUR SUPPLY CURVE ON RENT AND WAGE

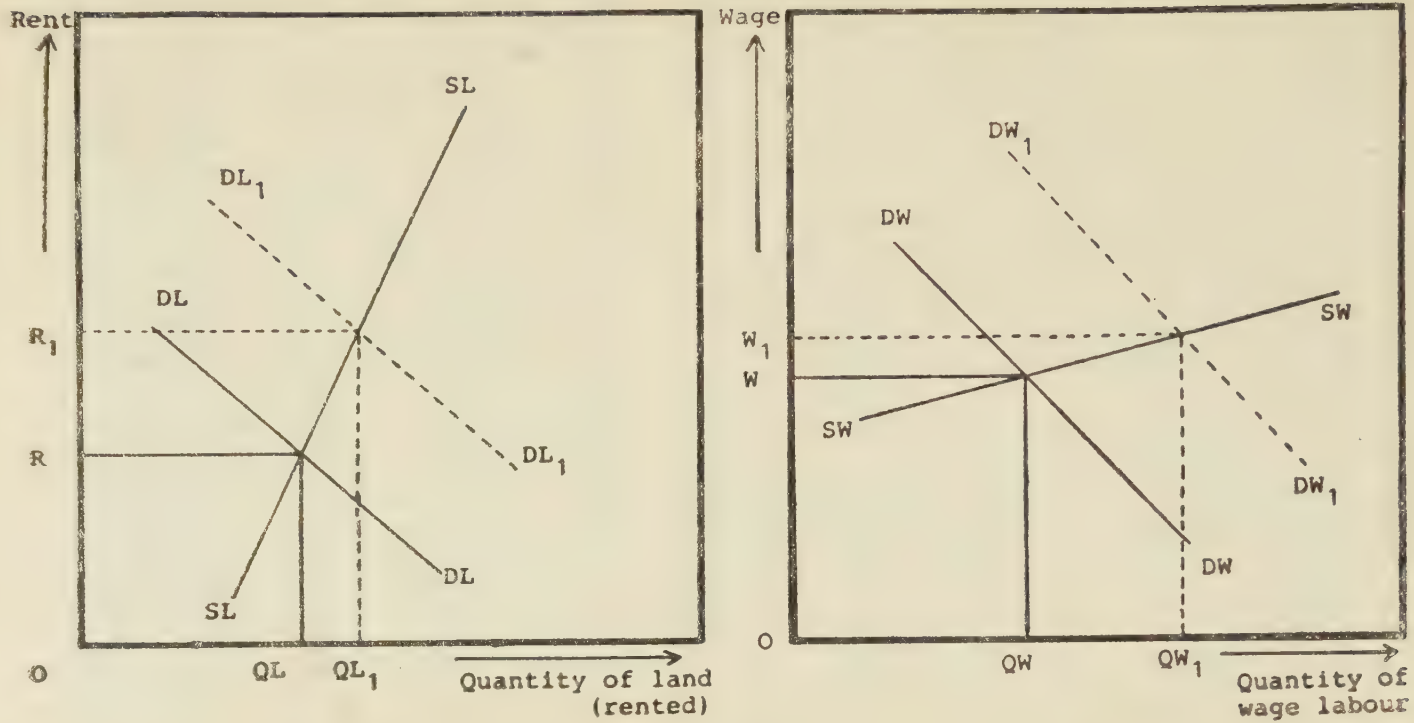

Figure 1

demand for rented land and wage labour is expected to increase from DL to DL_1 and DW to DW_1 respectively. Now, the tenants will have to pay a proportionately higher rent (increased by RR_1) to increase their area rented-in by $QLQL_1$. Contrarily, the owner operators have to make a proportionately smaller increase in wage (WW_1) to achieve a greater increase in the availability of wage labour ($QWQW_1$). That is why under the present circumstances the agricultural development programmes in Bangladesh, including that of Comilla approach, tend to increase rental income of landlords faster than wage income to farm workers. Since almost three-fourths of the total rented land in the study area is cultivated under share-renting arrangement (on 50 : 50 basis—which did not change over the past decade), it seems meaningful to look at the rental cost/gains also from the view-point of share-renting. Three important points must be remembered in this respect. Firstly, share-rent is half of the total yield so that the money value of landlord's half would be an underestimated measure of the actual rental cost to share-tenants since they receive only a half of the total yield against that cost whereas the cash-tenants get the total yield against a fixed rent. Secondly, under conditions of no-cost-sharing as in the study area, the level of input use and hence production on a share-rented plot is expected to be lower than on a cash rented plot. Thirdly, the yield difference between share-rented and cash rented land before green revolution would be presumably lower due to less involvement of modern cash inputs than during or after the green revolution.

Table VIII reveals the changes in the value of landlord's share of crops under share-renting arrangement during the period under study. The table has been computed on the basis of paddy yield only and without considering landlord's share of by products. (For the area under open market programme the potato acreage was added to rice acreage because during the period under comparison the farmers allotted their potential boro rice acreage to potato). As the table depicts, the real value of landlord's share based on one paddy crop dropped by four per cent in the cooperative area compared to a 49 per cent drop in the traditional village between 1972 and 1981 whereas it increased by 14 per cent in the area under open market programme between 1977 and 1981. When the change in the intensity of rice cropping is considered, the real value of landlord's share per year increased by 11 per cent and 15 per cent in the cooperative programme and open market programme respectively whereas it dropped by 49 per cent in the traditional village. Thus,the increase in productivity and croppingintensity helped maintain a steadily growing real value of landlord's share in the two development programme areas. It should be mentioned here that the grower

TABLE VIII

CHANGES IN THE VALUE OF LANDLORD'S SHARE UNDER SHARE-RENTING
(BASED ON PADDY CROP ; ASSUMING NO COST-SHARING)

Information	Cooperative Programme		Open Market Programme		Traditional Village	
	1981 n=25	1872 n=22	1981 n=31	1977 n=20	1981 n=13	1972 n=19
1. Yield per acre of paddy in maunds[a] (assuming one crop)	31.81	14.3	22.2	20.6	14.8	14.1
2. Landlord's share in maunds	15.9	7.2	11.1	10.3	7.4	7.1
3. Price of paddy in Taka per maund	115.63	51.47	110.24	50.44	111.33	44.06
4. Money value of landlord's share in Taka	1838.52	370.58	1223.66	519.53	823.84	312.82
5. Real value[b] of landlord's share in Taka at 1972 or 1977 price	356.31	370.58	590.17	519.53	159.66	312.82
6. 1981 real value as per cent of 1972 or 1977 value	96	100	114	100	51	100
7. Intensity of rice cropping per year	1.68	1.45	1.60[c]	1.58	1.43	1.42
8. Real value[b] of landlord's share of all paddy yields of the year at 1972 or 1977 price in Taka	598.60	537.34	944.27	820.85	228.31 (334.93)	444.21
9. 1981 real value as per cent of 1972 or 1977 value	111	100	115	100	51 (75)	100

a. Average for *boro*, *aus* and *aman* paddy yield on share-rented plots only.

b. Deflated by inverse factor based on 20% inflation per annum. Figures in parentheses are based on 15% inflation rate.

c. Assuming the potato area to be under *boro* paddy.

d. Row (8) = Row (5) × Row (7).

Source : Field survey and District Agricultural Marketing Office, Comilla.

price of paddy did not seem to have increased at the same rate as the over-all consumer price index of the country during the last decade (compare BBS 1981 and earlier bulletins) so that the increase in landlord's rental gains from share-renting in the two programme areas mostly came from increase in productivity and cropping intensity. Contrarily, even if we take a lower (15 per cent) infla-

tion rate for the traditional village the real value of landlord's share still registers a 25 per cent decrease in that area during the study period. So far as the cooperative area is concerned the increase in the value of landlord's share might have benefitted the non-member land owners too because the cooperative members rented in also non-members land and thus increased their operated area by 0.34 acres per farm between 1972 and 1981 (Table I).

IV. CONCENTRATION OF LANDHOLDING

It is often contended that the Comilla approach to rural development has been contributing to the process of agrarian polarization and concentration of landholding in Bangladesh. This contention may not be without foundation if one looks at the institutional framework of a Comilla-type cooperative which is geared to the interests of medium and large farmers as discussed earlier (see also Abdullah, *et al.* 1976 and Khan, 1979). Still, before making any sweeping judgement on the contribution of the Comilla approach on such structural changes as polarization and land concentration, we should carefully examine two pertinent questions in this regard particularly since it has covered only about one-third of all villages and approximately ten per cent of all rural households.

Firstly, is there any process of polarization and growth of concentration of landholding in areas without Comilla-type cooperatives ? If yes, this process could be a concomitant phenomenon of the general pauperization and proletarianization in the whole country whereby the cooperatives are playing the role of a "bias factor" in favour of their members. Secondly, who are the gainers and losers in the process of polarization and land concentration ? Are they the cooperative members and non-members respectively ? Or large and small farmer ? Probable answers to these questions will be sought in the following discussion.

Table IX shows the changes in the cumulative distribution of land ownership and Gini's index of concentration on the basis of data collected from three samples of households, 56 in each, selected by random procedure from the respective study areas.[3] Historical data on the changes in landownership were collected from these households for the years 1972, 1977 and 1982. It is to be noted that for this Table the random sample from the area under the cooperative programme (village Joypur) included both cooperative members and non-

[3] The effect of Middle East remittance on land market was eliminated by choosing areas without Middle East remittance.

members. This was done because of the assumption that during the process of polarization transfer of land may occur between members and non-members as well as within bothof these groups irrespective of membership status. Although the samples are not large enough to make general conclusions possible they may still offer some suggestive evidence to a cerntain extent.

Table IX shows that the trend of growing concentration of land ownership was not a specific phenomenon for the area under cooperative programme alone. The Gini's index of concentration of land in the area under cooperative programme increased between 1972 and 1982 in an almost similar fashion as in the traditional village. Also in the area under open market programme the index increased to the sams extent between 1977 and 1982, although it dropped slightly (0.01) between 1972 and 1977. This drop was due to sale of land by some large farmers for purchasing urban real estates. This, of course, is not a very common method of financing purchase of urban real estate by the rural elite in Bangladesh.

Table IX suggests that the increase in the number of landless as well as a rise in the share of households owning 1.50 acres or more in the total farm area were the main factors behind the growing concentration of landholding. This is also supported by Table X which reveals that in general the biggest majority of the sellers of land during the period between 1977 and 1982 belonged to the farm size group owning less than 1.50 acres and the overwhelming majority of the buyers belonged to households owning 1.50 acres and more. The data, however, do not allow the identification of the gainers and losers of land by their tenurial status (discussed in details in Ahmed, 1983). This may be also due to the small sample size.

More relevant for our purpose is the fact that although the concentration of landholding is not a specific phenomenon of the area under cooperative programme, the cooperatives gave the trend of polarization a bias in favour of its members. This will be evident if one consolidates the findings of Tables IX and X with those of Table I which indicates that the sample of cooperative members could increase their landholding per farm by 0.17 acres between 1972 and 1981 whereas the land ownership in the sample of simillar size group in the traditional village decreased by 0.11 acres during the same period. Also in the open market area the average size of land ownership decreased by 0.05 acres between 1977 and 1981. Much larger was the increase in operated area of the selected cooperative members. Their operated area per household increased by 0.34 acres during the period between 1972 and 1981 which probably suggests that

TABLE IX

TRENDS IN CUMULATIVE DISTRIBUTION OF FARM AREA OWNED BY OWNERSHIP SIZE AND GINI'S INDEX, 1972—1982

Size Group (acres)	1982		1977		1972	
	% Farms	% Farm Area	% Farms	% Farm Area	% Farms	% Farm Area
			Cooperative Programme			
Landless	17.86	a	8.93	a	8.93	a
0.01—0.49	39.29	4.57	35.72	4.93	32.14	5.69
0.50—0.99	57.15	17.69	57.15	21.21	50.00	19.00
1.00—1.49	76.79	42.65	76.79	46.96	76.79	50.24
1.50+	100.00	100.00	100.00	100.00	100.00	100 00
Gini's index	0.52		0.48		0 43	
			Open Market Programme			
Landless	30.36	a	21.43	a	17.86	a
0.01—0.49	46.43	2.66	42.86	3.67	44.65	4.77
0.50—0.99	57.14	9.28	55.36	11.13	55.36	10.31
1.00—1.49	64.28	15.63	66.07	20.17	60.07	19.80
1.50+	100.00	100.00	100.00	100.00	100.00	100.00
Gini's index	0.64		0.60		0.61	
			Traditional Village			
Landless	25.00	a	17.86	a	12.50	a
0.01—0.49	50.00	7.12	48.22	9.30	33.93	4.49
0.50—0.99	69.64	24.78	67.86	27.86	67.86	33.12
1.00—1.49	78.57	37.23	80.36	44.64	82.15	51.48
1.50+	100.00	100.00	100.00	100.00	100.00	100.00
Gini's index	0.60		0.56		0.50	

Note : This is based on data collected from three samples of households, 56 in each, selected by random procedure from the respective study areas.

a. None.

Source : Field survey.

the cooperative members deprived the non-member tenants of their earlier share in the total area offered by the landlords for tenant farming. The comparative advantage of the cooperative members against non-member tenants lay possibly in their (members) easy access to inputs like irrigation water, fertilizer as well as credit.

TABLE X

DISTRIBUTION OF BUYERS AND SELLERS OF LAND BY OWNERSHIP SIZE, 1977—1982

Ownership Size (acres)	Households Selling Land			Households Buying Land		
	No.	% in the Size Group	% in the Sample	No.	% in the Size Group	% in the Sample
		Cooperative Programme				
Less than 1.50	11	25.58	19.64	2	4.65	3.57
1.50 +	1	7.69	1.79	7	53.85	12.50
		Open Market Programme				
Less than 1.50	13	35.14	23.21	2	5.41	3.57
1.50 +	a	a	a	9	47.37	16.07
		Traditional Village				
Less than 1.50	9	20.00	16.07	1	2.22	1.79
1.50 +	1	9.09	1.79	4	36.36	7.14

Note : This table is based on data collected from three samples of household 56 in each, selected by random procedure from the respective study areas.

a. None.

Source : Field survey.

V. SUMMARY AND CONCLUSION

The data presented in the foregoing analysis seem to refute the hypothesis that the Comilla-type cooperatives can ensure equitable share of the poor in the development process by increasing employment and wage. Available data indicate that despite increase in volume of employment under the Comilla approach, real wage of agricultural workers declined in the long-run whereas rapidly rising land rent and land price provided for substantial wealth gains to land owners in real terms. The data do not indicate that the process of land concentration and polarization through land transfer is a specific phenomenon for the areas under Comilla cooperatives. It is rather a concomitant feature of pauperization in Bangladesh peasantry as a whole. Yet, the data indicate that the Comilla-cooperatives may represent a "bias factor" in favour of their members who seem to accumulate more land than non-members of the same size group.

Quantitative growth in Bangladesh agriculture through Comilla approach could be theoretically possible, but then the size and quality of the entire package of the programme with qualified technical staff, huge investment costs, credit service and highly subsidized input supply shall have to be in the same order as in the experimental area of Comilla Kotwali thana. Apart from its financial and monetary implications, such a large programme also runs the high risk of failure under heterogeneous socio-economic conditions in different parts of the country. The poor economic and organizational basis and weak group cohesion among members of the Comilla-type cooperatives organized in the recent years by the IRDP in other parts of Bangladesh bear evidence to this fact.

Additionally, in view of the absence of any built-in mechanism for guaranteeing the share of poor and marginal groups in the benefits of this programme, its scope is practically reduced to that of other government programmes for modernizing agriculture through private sector or open market sale of modern inputs. To the small and marginal families the Comilla approach seems to be no less discriminating than the open market sale of inputs through private sector. In the first case they are systematically excluded from the cooperatives by medium and large farmers whereas in the latter case their access to inputs is ultimately limited by their extremely poor purchasing capacity.

In the conclusion the question may be raised : what measures could be undertaken to overcome the problems of inequitable growth fostered by the cooperatives under the existing social set-up of Bangladesh ? Discussion on this issue among politicans as well as planners, including those in the official circle, seems to have plunged into a polemic and the discussions have so far yielded only vague commitments to "comprehensive rural development with land reforms, cooperatives and institutional change" (Planning Commission 1980, p. III-3). Setting aside the polemic on land reform and institutional change in Bangladesh which would call for long-term socio-political preparations at various levels, some short-term measures could be undertaken to alleviate the problem of inequitable growth under Comilla-type cooperative model. On the one hand, strict democratic measures could be introduced to ensure the due share of the poor farmers in the membership as well as management. On the other hand partial land reforms (rent reforms) and wage reforms could be implemented to fix suitable rental conditions and wage rates according to changes in the production. This would obviously demand a strong agro-economic research network and, above all, a genuine political willingness on the part of the administration.

The government authorities should recognize the emergence of landless labourers and tenants as a growing new element in the rural socio-political set-up and accordingly help them organize their own institutions or association for asserting their rights. Additional short-term measures may also be taken to increase the alternative employment opportunities of the poor and landless families in cottage industry as well as supplementary professions like that of vendoring, beef fattening, milch cow raising, poultry keeping, fish culture and postharvest processing.

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Inflation in Bangladesh : A Reexamination of the Structuralist – Monetarist Controversy

by

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Inflation has become an endemic feature of today's world, specially of the developing countries. Two broad schools of thought have emerged regarding the causes of inflation. The structuralists view it as a structural problem, that is, they see it essentially as the inevitable result of trying to push development strategies without making the necessary structural reforms. The monetarists, on the other hand, view inflation as a monetary phenomenon caused by inappropriate monetary and fiscal policies.

This paper attempts to analyse the inflationary process in Bangladesh in the light of the structuralist-monetarist controversy. To this end, three models of inflation are constructed and tested : a purely structuralist one, a purely monetarist one, and a hybrid model. The hybrid model performs best, suggesting that at least for Bangladesh, both sets of factors are relevant.

I. INTRODUCTION

Over the last few decades both the developed and the developing countries of the world have been suffering from the problem of inflation. However, the intensity with which inflation afflicted the developing countries was much more serious than that suffered by the developed countries.[1] Many economists believe that this markedly different rates of inflation experienced by the two groups of countries can not possibly be attributed to mere chance factors or

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[1] The average annual rates of inflation were 3.7 and 10.00 per cent during the period 1949-65 (Argy 1970), 4.2 and 13.00 per cent during 1965-70 (Little *et al.* 1970) and 8.5 and 25.6 per centduring 1970-80 (International Financial Statistics, 1975, 1981) in the developed and the developing countries respectively.

'faulty' monetary policies ; rather the reason must be sought in differences between the socio-political and economic structures of these countries. They believe that there are some fundamental differences between the factors that generate inflationary impulses and the mechanisms by which a price spiral manifests itself in the industrial and the developing countries of the world (ECLA 1961 ; Hagger, 1977 ; Kirkpatrick and Nixson 1976 ; Myrdal 1968 ; Seers 1964 ; Sunkel 1960) and, therefore, it is unlikely that the models of inflation pertaining to countries which have highly developed market economies with elastic supply responses in all sectors are applicable to the developing countries characterised by factor immobility, market imperfections and rigidities and disequilibrium between supply and demand in different sectors of the economy. Such a belief, strengthened by the failure of the stabilization policies pursued by many governments under the aegis of the IMF, led to the development of the "structuralist" school of thought during the fifties and sixties in Latin America. The structuralists viewed inflation essentially as a phenomenon inseparable from the *forced growth* process of the developing countries which was taking place under various structural constraints. Opposing this school were a group of economists loosely labelled "monetarists" who defended the official IMF position that inflation was a nominal phenomenon and could be controlled by appropriate monetary and fiscal policies. These two schools still continue to have very powerful influence on all economic analyses of inflation in the developing countries.

In this paper we shall make an attempt to analyse the inflationary process of Bangladesh in the light of the theories of these two schools. Bangladesh is a developing country and shares a number of features in common with other developing countries. It is only natural to expect that the factors generating inflation in Bangladesh should be roughly similar to those causing inflation in other developing countries. Ever since its violent birth Bangladesh has been in the grip of high inflation. Rapid increase in the price level has not only adversely affected different income groups and made rational economic calculations difficult, it has also increased social tension and shaken the confidence of the general public in the economic and social fabric of the country. The task of economic development in such an atmosphere is rather difficult. It is essential that the true nature of the inflationary price hike be clearly understood in order to plan the development process successfully.

The paper is organised as follows. The structuralist theory of inflation is discussed in Section IIa and a structuralist model of inflationary spiral is constructed. Section IIb is devoted to the construction of indices of structural

constraints and empirical tests of the structuralist model with Bangladesh data. The monetarist theory of inflation is stated in Section IIIa followed by empirical tests of the theory in Section IIIb. In Section IV the main strands of analyses of both the schools are captured in a hybrid model of inflation which is tested in the context of Bangladesh. Concluding remarks are contained in Section V.

IIa. THE STRUCTURALIST THEORY OF INFLATION IN A DEVELOPING COUNTRY

"I always speak of the change in money supply as a proximate cause, and say that deeper causes must be found in what are the explanations for the rise in money supply."

—M. Friedman

The structuralist explanation of inflation in a developing country is often identified with the United Nations Economic Commission for Latin America (ECLA) whose six-volume mimeographed study *Inflation and Growth* (ECLA 1961) was the first forceful exposition of this theory. Since then a number of writers have contributed to this discussion. Although there are differences of opinion among the economists known as structuralists, one can discern a unifying theme in their arguments which is both simple and illuminating. The main arguments of the structuralists on the causes of inflation in a developing country can be summarised as follows :

Inflation is inevitable in a developing country that is attempting rapid growth in the presence of structural constraints or bottlenecks which are inherent in the socio-political and economic fabric of the country. These constraints offer powerful resistance to growth and attempts to overcome these by orthodox policies inexorably give rise to inflation. Economies of the developing countries are typically characterised by market imperfections, imperfect knowledge of the economic agents, rigidities and disequilibria between supply and demand in different sectors of the economy. Shortages in certain sectors may exist side by side with considerable under-utilization of capacity in other-sectors particularly industry (Islam, 1978 ; Little, Scitovsky and Scott, 1970). Market imperfections prevent movement of resources from surplus to deficit areas to restore equilibrium. Hence a conventional explanation of inflation in terms of aggregate demand and supply does not apply to this situation and a structuralist interpretation which stresses rigidities and disequilibria in various sectors is relevant (Myrdal, 1968, p, 1926-7).

Of the various constraints, two are usually singled out by the structuralists as of primordial importance ;—the agricultural bottleneck and the foreign exchange bottleneck.[2] The agricultural bottleneck is often regarded as the consequence of institutional defects. Rapid growth of a less developed country entails increasing urbanization and a rising real income of the people. In most developing countries population is growing at a very fast rate. All these imply a rapidly growing demand for food which the agricultural sector is unable to meet. This sector is more often than not the most backward sector of the economy dominated by either the subsistence farmers or absentee landlords none of whom respond to market signals. Pressure of increased demand is then manifest not in increases in production but in increasing prices of foodstuff. Given the downward rigidity of industrial prices, an increase in the prices of foodstuff gives an upward push to the cost of living index which calls forth effective pressure of the workers to increase money wages and salaries. The demand inflation generated in the agricultural sector thus imparts a powerful stimulus to cost inflation to the rest of the economy.

Most developing countries are open economies with a substantial foreign trade sector. Import or foreign exchange bottleneck arises because export receipts of the developing countries tend to increase slowly not only because the income elasticity of demand for imports in the advanced countries is low but also because prices of primary goods that these countries typically export often suffer from a secular decline. Import demands of the developing countries, on the other hand, is income-elastic and increases rapidly owing to the forced development efforts. Rapid growth of the economy requires a large increase in the availability of machinery and equipment, industrial and raw materials and other manufactured goods that a developing country typically imports from abroad. When the total imports persistently exceed the export receipts and net capital inflow i.e., when the balance of payments persistently moves into deficit, the government is forced to take remedial measures. As a short-term cure of the payments problem import controls could be imposed and currency devalued. A longer term measure often undertaken in many developing countries is import-substitution industrialization. The introduction of import controls will increase the prices of the

[2] Some structuralists also recognize an industrial bottleneck which manifests itself whenever there is a marked shift in the demand for various goods. The industries, demand for whose products has risen, cannot increase their output easily and consequently their prices rise. However, prices of the products of the shrinking industries do not fall because of downward rigidity of wage and price so that the general price level tends to rise.

controlled items in the domestic market with the businessmen having the privilege to import reaping the rents. Imposition of tariffs will have similar effects on price but now the rents accrue to the public exchequer. The other way by which a developing country may attempt to improve its payments position is devaluation.[3] Whether or not devaluation eases balance of payments crisis, it will almost certainly impart an upward push to domestic prices of importables if unaccompanied by trade liberalization.

The longer term policy of import substitution industrialization (ISI) in the developing countries typically begins with the production of consumer goods which is likely to reduce their imports. However, most of the industrial raw materials and machinery for the production of these consumer goods have to be imported. ISI entails a strategic change in the composition of imports with the share of industrial inputs rising. A developing country pursuing ISI thus increases its dependence on foreign trade because it can not readily curtail imports without jeopardising development efforts (Baer, 1972). This increased dependence also increases its vulnerability to foreign inflation which is transmitted through input prices. Thus the policies, both short and long terms, adopted to improve balance of payments position impart an inflationary bias to prices of imported goods and their substitutes which in their turn inflate the domestic price level.

If it is agreed that the structural bottlenecks raises the price level, it is then pertinent to ask what transmission mechanisms keep price rising far beyond the level that can be justified in terms of the original cause. Lewis (1964) and Sunkel (1960) have stressed the importance of the transmission or propagation mechanisms in explaining the price spiral which affects different economies with *varying severities.* The first of these propagation mechanisms is the continuous struggle between different social classes including the government to maintain their respective real incomes and relative positions in the face of price increases. Sunkel has viewed the transmission mechanism as "the ability of different economic sectors and social groups continually to readjust their real income and expenditure : the wage-earning group through readjustment of salaries, wage and other benefits, private enterprise through

[3] Some structuralists consider devaluation to be another transmission mechanism of the inflationary impulse. Increase in the domestic prices of exports and importables reduces export demand and increases the demand for imports. The trade balance thus worsens which might force the government to devalue its currency. But devaluation usually increases the domestic prices of importables to which other prices may sympathetically respond giving another twist to the spiral process.

price increases and the public sector through an increase in nominal fiscal expenditures" (Sunkel, 1960, p. 111). The last of these brings to the fore another important component of the propagation mechanism ; the budget deficit. To build up social and economic infrastructure the government has to maintain the level of public investment at a fairly high level. Since in most developing countries the marginal ratio of government receipts to national income is below the average ratio because of excessive reliance on indirect taxation, a price hike increases budget deficit (Lewis, 1964). In the absence of a well-developed financial market the budget deficit is met by central bank borrowing. This increases the money supply which gives a twist to the spiral. To the structuralists, therefore, budget deficit and consequent increase in money supply is not autonomous. It is viewed as "a permissive factor which allows the inflationary spiral to manifest itself and become cumulative—it is a symptom of the structural rigidities which give rise to the inflationary pressures rather than cause of the inflation itself" (Kirpatrick and Nixson, 1976, p. 136).

Although the structuralist hypothesis was first formulated to explain inflation in some Latin American countries it is sufficiently general to be applicable to many developing countries in other parts of the world. A number of authors (including Myrdal, 1968 ; Kirpatrick and Nixson, 1976 ; Hagger, 1977) have recognised this. But so far only a few attempts, notably by Edel, 1969 ; Argy, 1970, have been made to assess structural contribution to inflation in developing countries (both dealt with Latin American countries only). The relative scarcity of empirical tests of the structuralist theory which has been the subject of a bitter controversy for over two decades is, no doubt, due to the sheer difficulty of such testing. Most of the structuralist discussion is in literary form and a quantification of the structural bottlenecks is very difficult. Nonetheless contributions made by Edel and Argy are valuable and could be followed up by similar studies for other developing countries.

Bangladesh is one of the least developed countries of the world. It is a largely agrarian economy in which about 60% of the GNP and 80% of the total employment is provided by agriculture. Agriculture is backward and yield per acre is low. Despite efforts to introduce HYV, irrigation and fertilizer technology. growth of agricultural production has lagged behind the growth of other sectors. Demand for food has increased at a rapid pace due to fast growth of population and increased urbanization. The mismatch between demand and supply of food has been reflected in the increasing price of food despite substantial control exercised by the government. The very ambitious development plans undertaken after independence have increased import requirements tre-

mendously but the export sector has maintained only a steady growth.[4] Thus a big gap has developed between foreign exchange requirement and availability. Most of this gap has been so far bridged by foreign aid. Despite a large inflow of foreign aid, payments deficit could not be wholly eliminated and various restrictions on imports were maintained which contributed to an increase in the prices of importables. When payments deficit became chronic the government was forced, usually under pressure from the IMF, to devalue the currency which further aggravated the inflationary situation. Deficit financing was resorted to when the situation demanded but not to a very great extent, chiefly because of the availability of foreign aid. It is apparent that the situation faced by Bangladesh is quite similar to the one discussed earlier. Hence it is plausible that a structural analysis of inflation could apply to the inflation process of Bangladesh.

In order to test the structuralist hypothesis it will be appropriate to set out a model that captures all the essential arguments of the structuralists. Such a model which is similar to the one developed by Hagger (1977) is given below :

(1) ... $p^a = f(A^b)$, $\quad \frac{d\,p^a}{d\,A^b} > 0, \quad \frac{d\,A^b}{d\,Y} > 0$

(2) ... $p^m = g(W, p^i)$, $\quad \frac{\delta\,p^m}{\delta\,W} > 0, \quad \frac{\delta\,p^m}{\delta\,p^i} > 0$

(3) ... $p^i = h(I^b)$, $\quad \frac{d\,p^i}{d\,I^b} > 0, \quad \frac{d\,I^b}{d\,Y} > 0$

(4) ... $W = W(p^e)$, $\quad \frac{d\,W}{d\,p^e} > 0$

(5) ... $p = p(p^a, p^m)$

Substituting p^a and p^m we get,

(6) ... $p = F(A^b, I^b, W)$

p^a = Annual rate of change of agricultural prices
p^m = Annual rate of change of manufacturing prices
p^i = Annual rate of change of import prices
p^e = Expected rate of inflation
P = Actual rate of inflation
A^b = An index of agricultural bottleneck
I^b = An index of import bottleneck
Y = Annual rate of change of real GNP
W = Annual rate of change of wage rate.

[4] Terms of trade also suffered a sharp decline particularly after independence.

Equation (1) states that the rate of change of agricultural price is an increasing function of the intensity of agricultural bottleneck while equation (3) states that the rate of change of domestic price of imports is an increasing function of the intensity of import bottleneck. Both bottlenecks are themselves increasing functions of the growth rate of GNP. Equation (2) needs some explanation. The price of manufactured goods are assumed to increase as a result of increase in costs.[5] Two components of costs are labour costs and material costs. Labour costs increase with an increase in the wage rate given productivity. The inclusion of p^i in equation (2) can be justified if it is used as a proxy of increases in material costs. This implicitly assumes that imported materials are a fixed proportion of the total material costs of the firms. These are rather sweeping simplifications of reality and are defended on the ground that these help us to obtain a price equation that has a limited number of variables as its arguments. Equation (4) states that W is positively correlated with the expected inflation rate. Equation (5) is the price equation which states that the rate of change of the general price level is a function of the rate of change of agricultural and manufactured prices (usually a weighted average). Substitution of p^a and p^m yields equation (6). If the structuralist theory were correct then an increase in the intensity of agricultural or import bottleneck would raise the rate of increase of the general price level. An increase in the rate of change of the wage rate also imparts an inflationary bias to the price level.

IIb. CONSTRUCTION OF STRUCTURAL INDICES AND EMPIRICAL TESTS

Given the above model, we need to quantify the intensity of agricultural and import bottlenecks in order to test the structuralist theory. Several indices have been devised to serve as proxies of these bottlenecks. The very word 'proxy' implies that these are not altogether satisfactory indices and suffer from a number of shortcomings. Three indices have been constructed to represent the agricultural bottlenecks. The first (I_f) is the ratio of total food imports to total food availability. If the agricultural sector is unable to meet the rising demand, the government is forced to import foodstuff to avoid famine conditions or excessive rise in food price. Thus higher food imports signify a worsening of the agricultural bottleneck.[6]

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[5] Demand pressure could also increase the industrial prices—more so because of the presence of the industrial bottleneck.

[6] It should be mentioned that food-import also enables the government to keep food price and hence the price level down.

The second (ED_a) and third (ED_p) indices of agricultural bottleneck are the difference between the growth in demand for and the growth in supply of food where supply is used to mean total foodgrain production in the case of the third index and total foodgrain production plus total food-import in the case of the second index. The rate of growth of demand for food was calculated by assuming that the population elasticity of demand for food was 0.6 as estimated by Mahmud (1979). These indices suffer from certain drawbacks which has been discussed later. Given these drawbacks a worsening of the agricultural bottleneck would be reflected in higher values (excess demand) of both indices.

The foreign exchange bottleneck has been represented by two indices. The first (T) is the rate of change of the terms of trade and the second (D) is the rate of depreciation of the currency. It has been discussed earlier that a worsening of the import bottleneck will create pressure on the government to devalue its currency.[7] More acute is the bottleneck more tends to be the rate of devaluation necessary to restore external equilibrium. The second index captures the effect of both devaluation and a change in the international prices of traded commodities. A worsening of the terms of trade will worsen the import bottleneck as more exports must be exchanged for the same volume of imports.[8]

After these indices were constructed, their impact on the price level was tested by means of liner regression analysis. Two indices were used to represent the general price level. One was the GNP deflator while the other was the cost of living index. As there is no data on the cost of living index for the country as a whole the cost of living index for the middle class Dhaka city-dwellers was used.[9]

The results of the regression analysis are presented in Table I and II. In Table I the rate of change of the GNP deflator is the dependent variable while in Table II, the rate of change of the cost of living index is the dependent variable. At first only two variables are introduced in the regression equations : one representing the agricultural bottleneck (I_f, ED_a or ED_p) and the other

[7] The government may, of course, directly restrict imports and subsidize exports instead of devaluing the currency.

[8] The government can, under certain circumstances, influence the terms of trade by deliberate policy interventions.

[9] This is not of much consequence since the rates of change of all cost of living indices appear to have been very similar.

TABLE I

REGRESSION RESULTS WITH THE RATE OF CHANGE OF THE GNP DEFLATOR AS THE DEPENDENT VARIABLE

Intercept	I_f	ED_a	ED_p	T	D	W	M	$\bar{R}^2$	D.W.	F. Value
— .256	3.584*			— .001				.640	1.878	6.184*
	(3.517)			(— .281)						
— .096	1.453				.888*			.840	1.608	19.884*
	(1.618)				(3.835)					
.137		— .003		— .0002				— .018	1.605	0.074
		(— .383)		(— .061)						
.047		.004			.011*			.823	1.736	17.442*
		(— 1.053)			(5.864)					
.134			—.004	— .0003				— .028	1.474	0.062
			(.352)	(— .065)						
.044			— .001		.011*			.808	1.524	15.729*
			(— .223)		(5.574)					
— .187	2.272			— .001		.601		.659	1.368	4.759**
	(1.544)			(— .277)		(1.218)				
— .106	1.735				.009*	— .215		.831	1.722	12.621*
	(1.598)				(3.374)	(— .494)				
— .006		— .003		— .001		1.156*		.589	1.004	3.464
		(— .439)		(— .249)		(3.186)				
— .038		— .004			.010*	.108		.810	1.697	10 886*
		(— .981)			(3.535)	(0.276)				
— .013			.003	— .0002		1.190*		.586	1.037	3.420
			(— .343	(— .083)		(3.171)				
.037			— .004		.009*	0.378		.807	1.588	14.358*
			(— .893)		(3 637)	(0.753)				

(*Contd.*)

TABLE I (*Contd.*)

Intercept	I_f	ED_a	ED_p	T	D	W	M	$\bar{R}^2$	D.W.	F. Value
— .225	2.640**			— .002			.448***	.696	2.143	5.665*
	(2.392)			(— .648)			(1.761)			
— .083	0.924				.008*		.306***	.861	1.963	15.931*
	(1.024)				(3.768)		(1.782)			
— .002		.004		— .002			.836**	.545	2.164	2.853
		(— .667)		(— .521)			(2.887)			
.0001		.001			.009*		.358***	.849	1.977	14.445*
		(— .137)			(4.656)		(1.770)			
.004			.009	— .003			.828*	.578	1.800	3.291
			(1.130)	(— .919)			(3.110)			
.003			.001		.009*		.384**	.850	1.921	14.530
			(.279)		(4.610)		(2.150)			
— .129	.910			— .001		.719	.492***	.731	1.502	5.708*
	(.652)			(— .638)		(1.669)	(2.040)			
— .079	.934				.008*	.308	.308	.851	1.975	11.941*
	(.884)				(3.120)	(1.659)	(1.659)			
— .073		.003		— .001		.898**	.608**	.727	1.485	5.594*
		(.505)		(— .622)		(2.882)	(2.569)			
— .013		— .0003			.008*	.154	.364***			
		(— .082)			(2.970)	(.437)	(1.812)	.839	1.915	11.088*
— .064			.002	— .002		.882**	.581**	.724	1.417	5.489*
			(.314)	(— .779)		(2.678)	(2.549)			
— .013			.001		.008*	.145	.380**	.840	1.891	11.114*
			(.175)		(3.060)	(.408)	(2.196)			

* Significant at 1% level, ** significant at 5% level & *** significant at 10% level.
Figures in parenthesis below the coefficients are the t-values.

TABLE II

REGRESSION RESULTS WHEN THE RATE OF CHANGE OF THE COST OF LIVING INDEX IS THE DEPENDENT VARIABLE

Intercept	I_f	ED_a	ED_p	T	D	W	M	$\bar{R}^2$	D.W.	F-Value
— .209	3.318*			— .001				.683	1.894	7.653*
	(3.912)			(— .325)						
— .068	1.444*				.007*			.875	1.666	26.816*
	(2.155)				(4.307)					
— .154		— .003		.0003				.013	1.497	0.132
		(— .514)		(— .095)						
— .073		.005			.010*			.857	1.710	22.762*
		(— 1.428)			(6.668)					
— .151			— .0001	.00004				.128	1.517	0.000
			(— .061)	(.013)						
— .070			— .004		.010*			.846	1,564	20.814*
			(— .995)		(6.452)					
— .147	2.131***			— .001		.543		.707	1.442	5.985*
	(1.769)			(— .324)		(1.337)				
— .076	1.662***				.008*	— .166		.868	1.712	16.984*
	(1.957)				(3.751)	(— .488)				
— .023		— .003		— .001		1.063*		.634	1.050	4.257**
		(— .631)		(— .316)		(3.506)				
— .062		— .004			.009*	.138		.849	1.710	14.372*
		(— 1.329)			(3.940)	(.455)				
— .011			—.006	— .0001		1.137*		.650	1.122	4.599**
			(— .932)	(.019)		(3.698)				
— .049			— .005		.008*	.262		.842	1.593	13.765*
			(1.134)		(3.669)	(.815)				

(*Contd.*)

TABLE II (*Contd.*)

Intercept	I_f	ED_a	ED_p	T	D	W	M	$\bar{R}^2$	D.W.	F. Value
— .175	2.301*			— .002			.482**	.776	2.099	8.764*
	(2.402)			(— .865)			(2.402)			
— .054	.831				.007*		.354**	.920	2.014	30.079*
	(1.368)				(4.809)		(2.893)			
— .019		.004		— .002			.819*	.641	2.026	4.349**
		(.726)		(— .675)			(3.545)			
— .021		— .0005			.008*		.402**	.908	1.923	25.804*
		(— .156)			(5.806)		(2.875)			
— .027			.005	— .002			.793*	.643	1.736	4.411**
			(.790)	(— .964)						
—. 020			— .002		.008*		.399*	.909	1.947	26.223*
			(— .453)		(5.973)		(3.173)			
— .101	.826			— .002		.644	.522*	.827	1.532	10.117*
	(.816)			(—1.296)		(2.059)	(2.980)			
— .066	.941				.007	— .014	.342**	.912	2.063	22.153*
	(1.298)				(3.860)	(— .050)	(2.684)			
— .050		.002		— .002		.806*	.629*	.823	1.510	9.877*
		(.647)		(—1.260)		(3.552)	(3.647)			
— .003		.0005			.007*	.188	.417*	.900	1.859	19.278*
		(0.153)			(3.469)	(.754)	(2.983)			
— .044			— .00004	— .002		.824*	.585*	.817	1.427	9.467*
			(— .007)	(—1.413)		(3.390)	(3.490)			
— 002			— .001		.007*	.201	.128*	.901	1.871	19.457*
			(— .355)		(3.711)	(.799)	(3.084)			

representing the foreign exchange bottleneck (I or D). Except in two cases, the explanatory power of the regressions is good and F-values are high.

The two cases in which $\bar{R}^2$ and F-values are very low occur when ED_a or ED_p is used as proxy for the agricultural bottleneck and T is used to represent the foreign exchange bottleneck. Next, along with these two variables, the wage variable W is introduced. $\bar{R}^2$ reduces marginally in three cases and in those cases cited above it increases greatly. In the next step we omit the wage variable and include the money variable M. Both the wage and money variables are then used along with the structural variables in the next regressions. $\bar{R}^2$ improves in only half the cases while in the other half it reduces slightly. There is no sign of autocorrelation of error terms in any of the regressions.

From the tables we find that the coefficient of the variable I_f, is statistically significant at 10% level or higher in about half the cases[10] and of the expected sign. A worsening of the agricultural bottleneck is manifest in an increase in the value of I_f and an increase in I_f causes an increase in the rate of inflation. However, the value of the coefficient varies widely with the lowest value roughly equal to unity. This would suggest that if the import content of total food available rose by one per cent it would cause the rate of inflation to rise by at least one percentage point.

The other two variables ED_a and ED_p representing the agricultural bottleneck are two indices of excess demand for food. It can be seen that, contrary to the structuralist theory, the coefficients of the indices are not only statistically insignificant but their sign is also not as predicted. The absolute values of these coefficients are also insignificantly small. Excess demand for food appears to have hardly any influence on the rate of price increase.

If it is accepted that either index of excess demand for food is an appropriate proxy for the agricultural bottleneck, two conclusions emerge : either agricultural bottleneck has no influence on the rate of inflation (which is equivalent to the rejection of the structuralist theory) or if it does have some influence certain factors not accounted for in the regressions have persistenly obstructed this influence from manifesting itself in an increase in the inflation rate. It is widely believed that one such factor is the governments price policy. It has been one of the fundamental policies of all governments to keep food

[10] The coefficient of I_f in Tables I and II is statistically significant at 20% level in almost all the cases.

prices within bounds of tolerance to avoid political unrest of a volatile population particularly the urban population. This could have distorted the price-excess-demand relationship. It is also possible that a surplus of foodgrains may not be reflected in a lowering of the rate of inflation because of monopolistic trading, hoarding and smuggling.

Another conclusion which may be deduced from the regression results is that the indices of excess demand as computed might not be correct and could over-or under-estimate the true value. A number of reasons could be responsible for this. The assumption of unitary population elasticity was arbitrary. Income elasticity of demand for food might not have been constant at .6 throughout the period. Increase in urbanization and industrial and other non-agricultural employment might have increased the demand for marketed food faster than what was computed. Another important thing which could have influenced the demand for food is income distribution. The high income people are known to spend a smallar proportion of their budget on food items than does the low income people. Thus a change in income distribution during the study period would have a corresponding impact on the demand for food which has not been taken into account. Errors in the estimation of excess demand for food could have crept in from errors in the calculation of the supply of foodgrains which was defind as total production of foodgrains or total availability. Change in production of foodgrains was treated independently of change in the price level. But it is very likely that an increase in the price of food crops relative to other crops like jute would induce an increases in food production. Thus the indices of excess demand as computed would underestimate the true magnitude of excess demand for food. It is, therefore, not clear if the apparent statistical insignificance of the coefficients of the indices of excess demand and the smallness of their value are due to an absence of any relationship between the rate of inflation and the agricultural bottleneck or to errors in quantification of the bottleneck. A resolution of this must wait the construction of a more sophisticated index of agricultural bottleneck.

The coefficient of the terms of trade variable T is also statistically insignificant. The sign of the coefficient is, however, always negative as implied by structuralist theory. The numerical value of the coefficient is also very small. It is interesting to note that when only structural variables are the explanatory variables in the regressions and ED_a or ED_p is used to represent the agricultural bottleneck and T is used to represent the foreign exchange bottloneck, the regressions explain very little of the variations in the dependent

variable. When the rate of devaluation D, is used as a proxy for the foreign exchange bottleneck, the explanatory power of the regressions is considerable. Even when there are only two explanatory variables D and I_f in the regression, $\bar{R}^2$ is as high as .875 when the rate of change of the cost of living index is the dependent variable and .840 in the other case. The inclusion of the money variable improves $\bar{R}^2$. The coefficient of D is invariably statistically significant at 1% level. The value of the coefficient is about .01. This implies that a one per cent devaluation of the currency would induce the rate of inflation to go up by about one per cent.

Inclusion of the wage variable W in the regressions reduces $\bar{R}^2$ and the coefficient of W is mostly insignificant even at 10% level. It is interesting to note that the wage coefficient becomes statistically significant at 1% level only when ED_a or ED_p is used as the proxy for the agricultural bottleneck and T for the import bottleneck. In these cases $\bar{R}^2$ improves markedly. When W is used along with I_f and D as the independent variables the explanatory power of the regressions does not improve. If the structuralist theory were valid this could be the case if I_f and D captured the structural bottlenecks well so that when these two variables are present in the regressions, inclusion of the wage variable which essentially transmits inflationary impulse from one period to the other, does not increase the explanatory power of the regression.

One of the elements in the structuralist theory is that increase in money supply is not autonomous, but a passive response to the structural bottlenecks. If it were true, then the introduction of the money variable in the regressions would produce results similar to what was achieved by introducing the wage variable. Contrary to the structuralist theory, the money variable does improve the explanatory power of the regressions significantly. The coefficient of the money variable is always significant at 10% level or above. Thus it cannot be said that the rate of increase of money supply does not have any autonomous influences on the rate of inflation. On the other hand, it is also not true that money supply alone is responsible for inflation. Only a fraction of the increase in the rate of money supply (as given by the coefficient of the money variable which is always significantly below unity) is translated in an increase in the rate of inflation.

Finally both the money and wage variables are used along with the structural variables in the regressions. As before, $\bar{R}^2$ improved only when ED_a or ED_p and T are used as the structural variables while in other cases

it is actually reduced. The coefficient of the money variable is generally significant while that of the wage variable is not. This only confirms the earlier result : the wage variable essentially transmits inflationary impulse rather than causing it while the money variable has some influence in increasing the rate of inflation.

To summarize and to recapitulate, either we accept that the structural bottlenecks have no influence on the rate of inflation or that the variables ED_a, ED_p and T do not truly present the structural bottlenecks. If I_f and D are regarded as good proxies for the structural bottlenecks then the regression result corroborate the structuralist theory. Wage variable seems to function essentially as a transmitter of inflationary impulse rather than being the cause of it. However, the structural position that money supply has no autonomous influence on the rate of inflation is rejected. There appears to be sufficient evidence that the increase in the rate of change of money supply contributes significantly to the increase in the rate of inflation.

III_a. THE MONETARIST THEORY OF INFLATION

"Money factors are not residual but at the very core of the process. The inflated countries are those that choose incompatible targets."

—R.O. Campos

In the preceding section it has been stated that in the opinion of the structuralists, the economies of the developing countries suffer from some fundamental structural bottlenecks that impede growth without overheating the economy. But the monetarists deny the existence of such autonomous brakes to growth. On the contrary, they allege that far from being autonomous or structural, the bottlenecks which do exist in the developing countries are the *consequences* rather than the causes of price and exchange rate distortions generated by inflation itself (Campos, 1961, p. 70). Agricultural bottleneck usually arises and/or worsens because of such faulty government policy as price control of foodstuff which interferes with the free play of market forces and has a disincentive effect on food producers. The foreign exchange bottleneck, too, is attributed to mistaken government policy of maintaining an overvalued exchange rate. Imports are thus subsidized and exports taxed, sometimes heavily ; "...this results in a disincentive to expansion and diversion of exports" (Campos, 1961, p. 76). Inefficient import substitution industries are encouraged while export industries are discouraged which help to worsen the foreign exchange bottleneck.

If the structural bottlenecks are the consequences of inflation, what then causes inflation in the developing countries ? The monetarist answer to this question is that "...inflation originates in and is maintained by expansionist monetary and fiscal policies, comprising government deficit spending, expansionist credit policies and expansionary exchange operations of central banks (Kirpatrick and Nixson, 1976, p. 136). Secular inflation cannot persist without a corresponding increase in money supply over and above the growth in real output and it cannot be controlled without limiting the expansion of money supply. Maintenance of a stable price level and exchange rate and the abolition of various controls and subsidies would rid the economy of various imbalances and supply rigidities which the structuralists claim are the fundamental facets of the economies of the developing countries. Once this is achieved, the latent dynamism of market economy will ensure steady growth : savings will be encouraged, exports promoted, foreign capital will flow in and investment in socially productive sectors stimulated. In other words, the monetarists strongly believe that if the economies of the developing countries are made relatively free, government interference kept at a minimum and price level is held steady,[11] the latent dynamism of the private sector can be trusted to propel the economy forward. Thus the monetarists strongly advocate the IMF—sponsored stabilization programmes comprising the removal of budget deficits, credit crunch, restoring the equilibrium exchange rate and elimination of controls. It is pertinent to mention here that the structuralists do not deny that inflation cannot persist without a secular increase in money supply. But what they emphasize is the importance of the underlying forces that compel the monetary authorities to increase money supply. While the monetarists consider the expansion of money supply exogenous and the result of some kind of 'financial irresponsibility' (Grunwald, 1964, p. 290), the structuralists recognize that the hands of the monetary authorities are forced by the structural constraints. Expansion of money supply cannot be choked off without risking recession and unemployment—a politically rather dangerous option. Moreover, controlling inflation by reducing *aggregate* demand would not remove any of the structural constraints that induce inflation and so short term stabilization programmes will be counter productive—it will be detrimental to long term growth of the economy.

[11] It is easy to see the contradiction in the argument. On the one hand, the monetarists are arguing against any government intervention in favour of free play of market forces and on the other hand they are reluctant to let price, the principal variable through which a market economy adjusts, be determined by the market forces.

III_b. EMPIRICAL TESTS

Unlike the structuralist theory, it is relatively easy to empirically test the monetarist theory. The monetary variables are well-defined and reliable data for those variables exist so that there is not much ambiguity in the tests. The monetarist theory was tested in a manner similar to Harberger (1963) ; Vogel (1974), using both the rate of change of the GNP deflator and the rate of change of the cost of living index as the dependent variable. The results of the regression analysis have been reproduced in Tables III and IV. When the rate of change of the GNP deflator is the dependent variable, there seems to be a one-period lag for the effect of an increase in money supply to show up in an increase in the price level. The coefficient of one-year lagged money variable M_{-1} is always positive and statistically significant. Thus even if the increase in money supply were completely halted, inflation rate would continue to rise and the impact of the monetary action would not be felt till the next year.[12] The sum of the coefficients of M and M_{-1} is significantly below unity i.e., a one-per cent increase in money supply does not induce a one per cent rise in the inflation rate. It will be remembered that the same was predicted in the previous section. Coefficient of the rate of growth of the gross national income Y is always negative and statistically significant. The rate of change of the gross national income and money supply, both current and lagged explains 74 per cent of the variation in the inflation rate. In the next regression equation another variable A, which is termed by Harberger (1963), the "acceleration variable", is introduced. The acceleration variable is the expected cost of holding cash and is represented by the difference between the rate of inflation in the past year and the year before that. The sign of the coefficient of this variable is, however, not as expected and it is not statistically significant. The inclusion of the acceleration variable actually reduces the explanatory power of the regression and it does not significantly alter the predictions. Hence one does not really 'need' this variable in the regressions.

In the next equation a wage variable is introduced. The role of wage in the inflationary process is subject to heated controversy. As Harberger puts it ; "An "extreme" monetarist would hold that wages were indeed passive and that once monetary factors had been adequately taken into account, the wage variable would not improve the explanation of movements in the rate

[12] Money supply in 1974/75 was lower than that in 1973/74, but the GNP deflator and the cost of living index rose by 70.2 and 60.5 per cent respectively during this period. They fell only during the next year.

of inflation" (Harberger, 1963, p. 227). This is, however, not corroborated by the next regression equation in which the wage variable W is introduced : explanatory power improves considerably and rises to .851. The coefficient of the wage variable is statistically more significant than any of the other variables. If the structuralist theory were true and the wage variable were indeed a transmitter of the inflationary impulses generated by the intensification of the structural constraints, then in the absence of the structural variables in the regression, the wage variable is likely to pick up their effects on the rate of inflation. Thus the last regression while rejecting the extreme monetarist theory provides evidence that the structural variables indeed have some influence in the variations in the rate of inflation.

Regression results when the rate of change of the cost of living index is the dependent variable are presented in Table IV. Increases in money supply now induces an increase in the inflation rate in the current year. In the first regression equation of Table IV, the lagged impact of M is much stronger than the current impact. The coefficient of M_{-1} is not only significant (at 5% level) but its numerical value is more than twice the value of the coefficient of M. When the acceleration variable is introduced the coefficient of M_{-1} becomes negative and statistically insignificant. The coefficient of M is, however, turned insignificant at 10% level. The coefficient of the acceleration variable is also insignificant at 10% level though $\bar{R}^2$ improves marginally because of the introduction of the acceleration variable.

When the wage variable is introduced, the coefficients of all other variables lose their statistical significance. But the coefficient of W is significant at 1% level and the explanatory power improves considerably. There is no evidence of autocorrelation in any of the regressions in Tables III and IV.

TABLE III

REGRESSION RESULTS WHEN THE RATE OF CHANGE OF THE GNP DEFLATOR IS THE DEPENDENT VARIABLE

Intercept	Y	M	M_{-1}	A	W	$\bar{R}^2$	D.W.	F-Value
.147	—2.788**	— 065	.616**			.743	2.283	7.252
	(—2.480)	(—.170)	(2.686)					
.137	—2.698***	—.033	.625**	—.022		.721	2.284	5.028
	(—1.861)	(—.066)	(2.462)	(—.105				
.103	—2.800**	—.274	.473	.120	.824*	.851	1.864	9.094
	(—2.560)	(—.715)	(2.395)	(.740)	(3.173)			

TABLE IV

REGRESSION RESULTS WHEN THE RATE OF CHANGE OF THE COST LIVING INDEX IS THE DEPENDENT VARIABLE

Intercept	Y	M	M_{-1}	A	W	$\bar{R}^2$	D.W.	F-Value
.103	—1.751***	.225	.472**			.752	2.109	7.550
	(1.805)	(.681)	(2.373)					
.0005	— .207	1.538	—.381	.002		.776	2.051	6.778
	(— .149)	(1.657)	(—.637)	(1.504)				
.007	—1.167	.337	.301	.001	.235*	.872	1.650	10.814
	(—1.043)	(.409)	(.583)	(.180)	(2.994)			

The foregoing results favour the rejection of the extreme monetarist theory that the structural bottlenecks are the consequences rather than the causes of inflation and as such when monetary variables are properly accounted for, the introduction of the structural variables (here represented by the wage variable) would not improve the explanatory power of the regressions. There is a strong ground to argue that in addition to the monetary variables, structural variables, too, have perceptible influence in the variation of the rate of inflation.

IV. THE STRUCTURALIST-MONETARIST HYBRID MODEL

We dealt with the structural model of inflation in Section II and found that contrary to what the structuralists claim the monetary variables did influence the variations in the rate of inflation. In Section III we tested the monetarist model of inflation and reached the conclusion that the structural variables had important contribution in the variation of the inflation rate. In this Section we propose to amalgamate these two models of inflation and develop a model that captures the essential arguments of both the structuralists and the monetarists. The equations of this hybrid model are :

(7) ... $P^a = f(A^b, M)$, $\quad \frac{\delta P^a}{\delta M} > 0$

(8) ... $P^m = g(W, P^i, M)$, $\quad \frac{\delta P^m}{\delta M} > 0$

(9) ... $P^i = h(I^b)$,

(10) ... $W = W(P^e)$,

(11) ... $D = D_1 + D_a$,

(12) ... $D_1 = D(P)$, $\quad \frac{dD_1}{dP} > 0$

(13) ... $M = M_1 + M_a$,

(14) ... $M_1 = M(D)$, $\quad \frac{dM_1}{dD} > 0$

(15) ... $P^e = (P_{-1})$,

(16) ... $P = P(P^a, P^m)$

Where D=Total Deficit spending and the subscripts i and a stand for the induced and autonomous parts of the variables respectively.

Equations 7 to 10 are the same as the ones used in the structural model with the exception that the rate of increase of money supply M has entered as an argument in both p^a and p^m. Equations 11 to 14 incorporate the monetarist argument in the model. The total deficit spending comprises an autonomous part and an induced part and so does the rate of change of money supply. If the structuralist theory were true, D_a would be zero and the whole change in D would be endogenous caused by an increase in the inflation rate. Similarly, the whole increase in the rate of money supply would be induced consequent on an increase in the rate of deficit spending. We assume a very simple expectation process (eqn. 15). To see how the model works, let us assume that the central bank increases money supply to accomodate some development expenditures undertaken by the government. This increase in money supply gives an upward push to the prices of both the agricultural and industrial goods by creating excess demand. Increases in p^a and p^m cause p to rise. In the second round an increase in P leads to an increase in W which causes p^m to rise and this leads to an increase in P. The increase in P forces the government to resort to deficit finance which leads to an increase in the money supply. This again exerts upward pressure on both p^a and p^m and hence leads to an increase in P. The sprial process thus goes on.

The model above contains ten equations and fifteen variables. Of these P_{-1}, M_a, D_a, A^b and I^b are determined outside the model. This leaves ten variables whose values are endogenously determined. Since the number of endogenous variables equal the number of equations in the model, the system has, under certain conditions, a unique solution. The price equation can be found by substitution :

(17) ... $P = P(P^a, P^m) = P(f(A^b, M), g(W, P^i, M)$
$= F(A^b, I^b, P_{-1}, M)$

Assuming that the relationship between the variables is linear, the equation has been estimated by the standard OLS technique. The results of the regression analysis are reported in Tables V and VI. In Table V the rate of change of the GNP deflator is the dependent variable while in Table VI the rate of

TABLE V

REGRESSION RESULTS WHEN THE RATE OF CHANGE OF GNP DEFLATOR DEPENDENT VARIABLE

Intercept	I_f	ED_A	ED_p	T	II	P_{t-1}	M	$\bar{R}^2$	D.W.	F-Value
—.211	2.421**			—.001		.083	.458***	·674	2.203	4.210 **
	(2.131)			(—.215)		(·383)	(1.732)			
—.076	.899				.008*	—.018	.305	.852	1.940	11.951*
	(1.003)				(3.686)	(—.635)	(1.635)			
—.024		.003		—.0004		.186	.803**	.852	2.537	2.382
		(.495)		(—.130)		(.754)				
—.001		—.001			.009*	.009	.359***	·839	1.990	10.884*
		(—.151)			(4.435)	(.060)	(1.771)			
—.043			.012	.0001		.349	.812*	.621	2.405	3.298
			(1.549)	(—.021)		(1.553)	(3.315)			
—.006			.002		.009*	.030	.397**	.841	2.132	10.971*
			(.320)		(3.903)	(.186)	(2.094)			

TABLE VI

REGRESSION RESULTS WHEN THE RATE OF CHANGE OF CLI IS THE DEPENDENT VARIABLE

—.179	2.089**			—.001		.150	.507**	,782	2.510	7·366*
	(2.468)			(—.516)		(.831)	(2.556)			
—.071	0.837				,007*	.086	.371*	.918	2.122	23.457*
	(1.392)				(4.514)	(.819)	(2.979)			
—.018		.002		—.001		.249	.795*	.668	2.694	4.075**
		(.415)		(—.400)		(1.137)	(3.613)			
—.001		—.001		—.001	.008*	.119	.419*	.906	1.993	20.109*
		(—.256)			(5.382)	(1.034)	(2.999)			
—.034			,009	—.001		.371***	.810*	.718	2.628	5.188**
			(1.474)	(—.347)		(1.813)	(4.222)			
—,005			.001		.007*	.126	.449*	.906	2.382	20.130*
			(.278)		(4.833)	(1.022)	(3.326)			

change of the cost of living index is the dependent variable. As before, the coefficients of I_f, D and M are mostly statistically significant. The coefficient of T, though of the 'right' sign is not significant. The coefficient of ED_a is neither significant nor is the sign always as expected. Although the coefficient of ED_p has the expected sign, it is statistically insignificant at 10% level. The coefficient of P_{-1} is not significant in Table V but of the expected sign except in one case. However, the t-values of P_{-1} in Table VI are somewhat high and significant at 10% level once. The explanatory power of the regressions is generally quite high ranging from 0.542 to 0.918. At least 54 per cent of the variation in the inflation rate is explained by the regressions if these four variables are taken into account. If D, I_f, P_{-1} and M are used as the explanatory variables $\bar{R}^2$ reaches 0.918 in Table VI and 0.852 in Table V. $\bar{R}^2$ is generally low when ED_a and T are used as the explanatory variables.

The rate of change of money supply and devaluation seem to be the most important explanatory variables in these regressions. Any devaluation of the domestic currency is followed by an almost equal proportionate increase in the rate of inflation. An increase in money supply does not induce an equal proportionate increase in the inflation rate as would be suggested by an extreme monetarist theory. The coefficient of M is significantly below unity in all cases. This could happen if the whole increase in money supply is not autonomous, but part of it is induced by other variables already taken account of in the regressions. If the growth rate of money supply outstrips the growth rate that is induced by the structural constraints, this increase would exert an independent upward pressure on the rate of inflation.

V. CONCLUSION

The findings of this study are only indicative and should be viewed with some caution. It has been carried out in highly aggregative terms and suffers from the problems associated with such aggregation. A more disaggregated approach with some sectoral breakdown could have captured the nature of price behavior in different sectors of the economy and yielded more realistic results. This analysis had to rely exclusively on OLS technique of estimation because of lack of computer facilities. It was not possible to use more sophisticated estimation techniques to take account of the problems, if any, of simultaneity and nonlinearity. If the underlying relationship among the variables is nonlinear, the estimated parameters would be biased. Predictions based

on these would be, therefore, unreliable. Taking cognizance of these limitations of the study, some tentative conclusions may now be ventured.

An attempt to correct external payments imbalance by devaluation (as often suggested by the IMF) is going to trigger off an inflationary impulse that will reverberate throughout the economy. Hence it may not give any comparative advantage to the industries in the traded sector of the economy. It is not certain that devaluation will reduce imports. Much of tbe imports comprises food items, industrial raw materials and machinery. Their imports cannot be reduced greatly without provoking adverse chain reaction in the economy. Under the circumstances, the country will end up paying more for a reduced volume of imports because of devaluation. Also it is not certain that the total export earnings will increase. If the foreign demand for our exports are price-inelastic, devaluation will actually reduce export receipts. Thus the balance of payments position could worsen rather than improve. The IMF would most likely follow-up the events by suggesting another round of devaluation.

A slow down of the growth of money supply will have some moderating influence on the inflation rate. But it cannot be expected to reduce the inflation rate below the point dictated by the *growth target* of the economy in the presence of the structural bottlenecks. Some increase in money supply is essential if a mixed economy like Bangladesh suffering from structural constraints is to grow. If growth in money supply is completely halted, it would adversely affect the economy, particularly the private sector and jeopardize the development efforts of the country.

It is evident that the causes of inflation are much more deeprooted than would be suggested by a naive monetarist hypothesis. Inflation cannot be controlled without first easing the structural constraints or *lowering* the growth rate below what is socially acceptable and politically judicious. Removal of strructural constraints involves a massive social and economic change which cannot be expected to come about painlessly or under the existing order of the society.

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Appendix

TABLE 1

Year	Gross National Income at Current Market Prices (CroreTaka)	Money (Narrow Supply) (Crore Taka)	GDP Deflator 1959/60 =100	Cost of Living Index 1959/60 =100	Index of Wage Rate 1959/60 =100	Terms of Trade 1959/60 =100	Exchange Rate (Taka per US Dollar)	Total Production of Foodgrains ('000' tons)	Total Import of Foodgrains ('000' tons)	Population (Million)
1	2	3	4	5	6	7	8	9	10	11
1959/60	1449.0	141.3	100.0	100.0	100.0	100.0	4.785	8586	612	53.45
1960/61	1635.7	166.0	107.3	99.2	109.4	153.0	4.777	9643	698	54.53
1961/62	1749.1	177.0	106.4	103.4	199.0	118.0	4.778	9608	488	65.96
1962/63	1852.7	198.5	110.9	105.1	139.5	101.0	4.787	8884	1436	57.43
1963/64	1870.6	217.5	102.4	107.7	142.5	114.0	4·798	10579	1002	58.94
1964/65	2067.2	258.5	110.8	116.2	152.5	133.0	4.793	10454	345	90.48
1965/66	2287.0	275.7	117.3	122.2	149.5	121.0	4.793	10516	923	61.94
1966/67	2645.6	300.3	135.3	135.9	152.8	174.0	4.789	9556	1100	63.43
1967/68	2819.7	312.0	132.2	135.9	144.9	142.0	4.791	11135	1019	64.95
1968/69	2988.0	331.2	136.1	142.7	149.6	138.0	4.800	11344	1119	66.52
1969/70	3263.0	350.7	145.7	148.7	151.0	136.0	4.797	12004	1547	68.12
1970/73[a]	4547.8	696.0	264.6	270.1	197.4	152.2[b]	7.350	10087	2825	74.37
1973/74	7130.0	816.8	373.1	375.2	216.3	101.5	7.940	11896	1666	77.03
1974/75	12603.5	814.5	635.1	606.0	334.2	93.9	13.671	11289	2558	78.96
1975/76	10776.4	901.2	483.4	565.0	368.4	84.5	14.959	12859	1445	80.82
1976/77	1v578.6	969.6	467.5	569.0	380.6	95.1	15.531	11977	795	82.71
1977/78	13151.9	1288.1	538.9	655.6	422.5	115.3	15.063	13232	1609	84.66
1978/79	14661.6	1419.4	573.2	722 2	522.6	128.6	15.631	13378	1162	86.64
1979/80	16549 .6	1725.0	615.5	826.5	697.9	155.1	14.789	14176	2826	88.68

a. 1970/71 and 1971/72 have been dropped from the series because data on many of the key variables are not available. These were a highly abnormal period as liberation war was fought during this time.

b. The index of terms of trade for 1972/73 (relative to 1969-70) was constructed by using the index developed by W. Mahmud in his unpublished Ph. D. dissertation *Food Supply and Agriculture-Industry Balance in a Low Income Economy : The Case of Bangladesh.* Cambridge University, 1978.

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Official Industrial Wage Data in Bangladesh, 1972/3—1976/7

by

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This paper makes an attempt to assess the adequacy and representativeness of Bangladesh's only published official timeseries data on money daily wage rates in industry with a view to interpreting the experience of her large-scale industry about the movement of real wage levels prevailing in the quinquennium 1972/3—1976/7, The desire to interpret this experience is premised on both its analytical and historical relevance to a proper inventory of facts. We argue that the abovenoted data, generated by the Bureau of Statistics (BBS), while it purports to estimate average wage rates in five industries, must be adjudged to be poor estimates, largely because, by improperly aggregating establishments of varying size, and covering respondents with potentially differing personal and occupational characteristics from one year to the next, the underlying sample involves a degree of misplaced aggregation. A perhaps more important conclusion we reach is that, while a knowledge of the experience of Bangladesh's large scale industry during the quinquennium 1973—1977 is of a certain historical and analytical interest, the BBS industrial wage data has to be adjudged an inaccurate guide with regard to the most important segment, from the point of view of that particular experience, of Bangladesh's large scale industry, viz., the nationalized industry. Empirically, we show, that BBS data show no reflection of the very considerable increases achieved by public-sector workers in 1973/4, that since 1973/4, proportionate annual increments underlying BBS data have mostly been higher than, and extraordinarily more variable than, the matched increments for large industries, and finally that real wage levels derived from BBS data understated, despite higher annual increments, the matched levels in the nationalized industries by between 10% to 17%, depending on the industry type, between 1972/3 and 1976/7.

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I. INTRODUCTION

In Bangladesh, the only official published time series data on nominal daily money wage rates (wage rates, hereinafter) of workers in industry are regularly produced by the Bangladesh Bureau of Statistics (BBS). Shown separately for skilled and unskilled workers, these data are published for five industry groupings and five locations. This is an exercise into the adequacy of this mass of wage data for faithfully interpreting the experience of her large-scale industry as regards real wage movement in the quinquennium 1972/3–1976/7. Behaviour of real wages in large-scale industry, as distinct from the small-scale industry, during this quinquennium in Bangladesh would appear to have considerable historical, social and economic interest. Historical interest because this quinquennium, the first three years of it at any rate, witnessed almost total nationalization of large-scale industry and was a period of generalized labour ascendancy; whether nationalization, as may be expected, had in fact led to increases in real wages over those five years therefore merits an examination. A knowledge of behaviour of real wages in large-scale industry is also of economic interest in that, during this period, the preponderant proportion of public investment was concentrated on the large-scale industry (Chowdhury 1981, Table 5.16).

On a related level, one frequently needs a basis for raising a few interesting questions about wages in industry in the context of the emerging experience of a developing country, arguably modelled a la dual economy models of development (Fei and Ranis 1964 ; Lewis 1954). Have real wages levels risen, remained constant or declined and what elements, on the supply/demand or institutional side, explain this behaviour ? Whatever be the experience about real wages in large industry, what implications does that have for the relevance of the dual economy models for Bangladesh ? We believe that it is the wage experience of the large-scale industry that is relevant to the dual economy models of development. We suggest that these are some of the important questions worth asking in the light of real wage levels in large industry in Bangladesh. Of course, it is not our intention in this paper to seek to answer all these questions at the same time. In this note, we set ourselves the modest research objective among other things, of estimating absolute real wage levels in Bangladesh's large-scale nationalized industry. After all, this must be seen as the opening question in the specific context of the discussion in this paragraph. But it remains an important aspect to this exercise that it attempts to assess the nature of the BBS data in a suitable context.

BBS publishes two rather different types of data on labour earnings. The Census of Manufacturing Industries (CMI) questionnaire solicits data relating to average daily employment during the year concerned and total wages paid, and publishes the ensuing index of average nominal earnings corresponding to industries variously aggregated at 2 or 3 digit levels. Normally, the data required to estimate levels of nominal earnings are also typically available within the CMI findings. This body of the data are collected by Industry section of the Industry and Labour Wing of the BBS. These data are not at issue in this paper. The other body of the industry wage data BBS publishes are collected by Prices & Wages Section of the same Wing, although, as we note below in context, these are collected by field staff who belong to the Survey Wing of BBS. These data are collected, among other respondents, from a fixed sample of one enterprise from each of cotton textile, jute textile, engineering, edible oil and match industries from each of the districts of the country. From these preselected enterprises, one unskilled and skilled worker each is selected, for each monthly interview. The total earnings reported by these workers are then suitably deflated to arrive at daily earnings. These mass of data, which are published monthly for five industries and six different centres, are at issue in this paper.

One of the core arguments of this paper is that latter set of BBS data on wage rates are based on such a sample that they are not adequately representative of large-scale industry in Bangladesh in the post-liberation period and, as such, does not provide an accurate enough basis for discussion of the above and other interesting questions.[1]

While a brief appraisal of the relevant body of BBS data is deferred for Section II, it is not amiss at this stage to note the statistical requirements of any worthwhile attempt to accurately estimate average wage in large industry. Minimally, one needs a consistent, stratified sample of enterprises, the most important criterion of stratification being size of establishment. This is because size of establishment has a positive causal influence on the rate of labour

[1]Our attribution of inadequacy to the BBS data is intended to be specific to the presumed analytical importance given to these foregoing questions. This attribution may or may not be appropriate for a different set of questions.

earnings.[2] Now, it is critical, for purposes of estimating a time series of average wage, to accurately identify the number and relative importance of the various strata of establishments composing the industry of interest. To take an example, any wage exercise in Bangladesh's cotton weaving industry has to square itself with the fact that there is a very substantial powerloom subsector employing 30 workers on average, a smaller subsector of the specialised weaving units employing 250 to 300 workers on average, and finally again a substantial sector of large mills employing 1000 workers or more.[3] If however the sample is not consistently drawn and, particularly important, if its coverage, from one time period to another, results in unequal probabilities of small and large enterprises or of workers of varying personal or occupational characteristics that have a certain bearing upon wages earned, then it has to be regarded as involving a degree of misplaced aggregation.

There is yet another basis for stratification which may be particularly important in the context of Bangladesh industries. This is because a very large part of Bangladesh's industrial activity is in textiles of various sort e.g., spinning and weaving of yarn and cloth in jute and cotton. This basis for stratification may be said to lie in the nature of the technology in spinning and weaving and the relative feasibility of payment by time as distinct from result. More specially, while spinning tends universally to pay by time, weaving tends likewise to pay by results. The crucial point to note here is that earnings per

[2]This is found to be the case in a sample of firms in three activities of Bangladesh (Chowdhury 1981). Data processed for a further paper to be prepared by the author suggests that in the power-using textile weaving industry, there is a difference of between 25 to 40% in annual earnings setting the powerloom sector off from the large mills. In other words, that size of firm is a positive causal force on earnings cannot be gainsaid. It is possible that in an expanded regression framework the inclusion of variables about skills, educational levels, training, etc. can cause the size variable to lose some of its significance. But, even so, size usually retains a certain measure of its significance. Note that we are aware that earnings and wage rates per day are not the same things, but that we shall maintain that small scale units are likely to score unfavourably on the number of days worked per year relative to larger units. Hence the comparison referred to is not invalidated if wage rates, not annual earnings, be the basis for discussion.

[3]A survey relating to 1976/7 found employment per unit in the small-scale powerloom sector in the Dhaka district to be about 30 (Chowdhury 1981). A census of private "largish" textile units relating to 1978 reported an employment per unit to be 273, while the matched figure for the nationalised mills was reported to be 1117 (Bangladesh 1978, pp. 18—9).

unit time in weaving may potentially be more variable than in spinning, in that conditions affecting results of labour effort in weaving may vary while spinning guarantees a certain level of earnings.

To what extent are the nominal and real wage data relating to unskilled workers of the BBS sample representative of the fate of the equivalent category of workers in the nationalized sector, together with the identification of analytical and policy implications from any possible discrepancy observed is therefore of interest in this paper. It is organised into four further sections. Section II outlines and appraises the sources of data, and takes note of the definitions used in the following. Section III presents our finding. Section IV draws certain relevant implications, while Section V offers certain policy conclusions.

II. DATA, DEFINITIONS AND METHODS

Data

Basically, we use two sets of data. One of these, as noted above, is due to BBS and will be used to yield relevant nominal wage and cost-of-living index of the unskilled industrial workers (Bangladesh (various issues), Bangladesh 1975). As for wage data, this source gives monthly average daily wage rates for industrial workers at five selected centres. The data exclude payments in kind, such as for food, housing and medical facilities. These monthly averages have been further averaged on an annual basis for this paper. It is important to note the following aspects of this wage data. While the establishments at each district are held fixed in sampling for the interview, the respondent selected in each monthly interview is however not held fixed, thus introducing a force which can potentially cause significant variation in reported wage earnings. In sofar as workers belonging to any given establishment can display considerable variation among themselves in terms of personal, occupational and institutional (i.e., whether time—or piece-rated) characteristics which influence potential wages, the fact that the respondents are not held fixed makes for variations in wages unrelated with any changes in the *terms* of employing a typical worker.

As for the wage data of the nationalized industry, use is made of the wage recommendations contained in the report of the Industrial workers Wage Commission (IWWC) (Bangladesh 1973), information gathered from various sector corporations regarding the implementation of IWWC recommendations, and International Labour Organisation reports due to (Natarajan 1977a ; Natarajan 1977b).

Definitions

Wage incomes should, ideally, be defined so as to cover all net incomes as a result of productive services by workers. Relevant here are various components, whether cash or inputed, guaranteed or contingent, of the wage-packet. These components may be the following : (i) basic wage ; (ii) allowances for or imputations due to environmental support like housing, medical, transport and other in-work facilities,[4] (iii) guaranteed bonus, if any, (iv) variable bonuses contingent on the firm's capacity utilization or profitability , (v) payments made by the employer/state of an welfare type e.g., the contributions of the employer to the provident fund or group insurance schemes and (vi) the wage equivalent of the workers' eventual entitlement to gratuity, suitably discounted, in respect of the period for which the wage incomes are being estimated.

BBS indicates only that its data on daily wages exclude payment in *kind* such as for food, housing and medical facilities. Presumably, this means that if these environmental supports are given as a part of the total wage in cash, they have been included.[5] Thus, BBS data cover component (i) in all cases, and (ii) in some or all cases, while there remains uncertainty about the treatment of components (iii) to (iv). As for the nationalized sector, we may first of all sensitise ourselves about the system of wage determination since July 1973.

Nearly all large-scale industries is Bangladesh were nationalized in 1972, Before liberation, Bangladesh had a rather chaotic wage structure except perhaps in the jute industry, in that essentially the same job was designated and remunerated variously by different enterprises in the same industries. The Government appointed the Industrial Workers' Wage Commission (IWWC), 1973, to recommend a rationalized wage structure. The Commission recommended a total of 33 scales for the entire nationalized sector. A national minimum wage scale of Tk. 155-5-205-6-235 was recommended for the unskilled workers

[4]In Bangladesh prior to liberation many enterprises in the steel sector used to provide subsidised lunch to the workers while in work. Likewise, a certain scheme of rebates on electricity consumed by workers using mill accommodation was in force at times. Any comprehensive definition of workers' income should include benefits such as these.

[5]Since BBS does not indicate what percentage of establishments make payment in kind of the type excluded from the earnings data or the typical extent of the benefit excluded, it is not possible to imagine what differences to its data benefits in kind.

in all nationalized industries. The Commission also recommended cash fringe benefits for environmental support like house-rent allowance, medical and conveyance allowances, and these are presented in Appendix Table 1. Also recommended was the payment of one month's basic wage as a guaranteed festival bonus.

There already existed, and the IWWC retained, two broad systems of workers' compensation namely, time-rate and piece-rate. Under the former, the workers are paid by the month. The latter system, better designated as payments by result, is more complex. Here, remuneration has a direct and continuous relationship with the output of the worker or the average product of his group. All piece-rated workers were graded by the Commission and guaranteed a certain basic wage depending on their respective grades. Under this system, a worker can earn more than his basic wage by surpassing the specified rate of output. Unskilled workers, however, are all time-rated.

To provide wage incentives, the IWWC recommended an Incentive Bonus Scheme, under which all workers of a plant which exceeded a certain proportion of its rated capacity, were entitled to a certain incentive bonus fixed as a percentage of the basic wage. Certain other bonuses, which have not in fact been important sources of workers' income, like the profit bonus and the attendance bonus, were also recommended. Incomes from incentive bonus depended on capacity utilization. Profit bonuses, paid at the rate of 2.5% of net profit after charging taxes and depreciation, depended on net profitability of enterprises.

Concerned with wages for unskilled workers, we included only "guranteed" wages. That means, we have taken into account components (i), (ii) and (iii). It is true that in some of public-sector industries the unskilled workers have earned wages explicitly on account of component (iv) and implicitly from components (v) and (vi) as well. However, components (iv) to (vi) were excluded here because of data limitations.

Methods

BBS data are used to yield wages rates during 1972/3 to 1976/7. The same source is used to estimate the relevant cost of living index. BBS average annual daily wage rate for unskilled workers is then compared with the like figure for the nationalized sector as of the year 1973/4. Then, the average annual rate of wage increments underlying BBS data are outlined. We then estimate annual rate of wage increments for the nationalized sector, using implemented reco-

mmendations of the IWWC[6] as the basis. The resultant estimates of money and real wages in the years 1972/3 to 1976/7 are compared with the figures obtained from BBS data.

Limitations of the Paper

One of the limitations of this note is that earnings in the nationalized industry here include festival bonus, the payment of which has been contingent on attendance. For example, in the textiles industry, full bonus was to be paid to the worker with annual attendance of 213 days ; and half bonus for the worker with 107 days. Since high absenteeism disqualifies workers from festival bonus using nominal entitlement of such bonus payment could lead to overstatements of actual earnings. On the other hand, the attendance norms in this regard must be said to be very liberal. Total number of paid holidays in the industry in a year is 102 (52 Sundays, Casual Leave 10, Medical Leave 14, Festival Leave 10, and Earned Leave 16). A worker can, and frequently does, work for 240 or more days in a year. Thus, entitlement to fastival bonus is rarely, if ever, forfeited because of the permissiveness of the basis implied.

A second supposed limitation of the paper is that in focussing in 1981 upon the wage experience in the economy in the early and mid 1970's, it is out of date and lacks topicality. However, we have used the adjective 'supposed' advisedly in the above. We intend this paper to be more of a methodological than empirical paper, which critically probes the methodological basis (sample, definitions, etc.) implicit in BBS data and uses data as to the nationalized sector only to provide a point of reference for the evaluation of that basis.[7]

[6]The IWWC recommendations in respect of wage scales were implemented uniformly by all sector corporations except the Bangladesh Jute Mills Corporation (BJMC). While the IWWC's provisions were implemented vide Government Notification dated 8th January, 1974 in all industries other than jute, the BJMC and the representatives of the Bangladesh Chatkal Sramik Federation (BCSF) mutually agreed to withhold annual increments (and thereby the concept of wage scales) and to reduce norms regarding efficiency for determining the base-rate of payment of the piece-rated workers (Bangladesh 1977). As a result, the guaranteed rate of the unskilled worker of the jute industry did not increase at the same rate as in other nationalized industries. This difference has to be borne in mind. Another aspect of differential implementation by the individual sector corporations of the IWWC provisions is that the BJMC did not pay any incentive bonus on capacity utilization, while the other corporations did.

[7]There is another justification for focussing on the quinquennium 1972/3—1976/7. This in retrospect, seems to have been a watershed in being characterised by nationalization of most of large-scale industry but by being both preceded and succeeded by epochs of economic policies which sought to promote private enterprise in industry by conscious design. What we mean by preceding and succeeding epoch ought to be self-evident. Now the behaviour of real wages of unskilled workers inside nationalized industries in this watershed is of real historical interest to students of industry in Bangladesh. On this score, this exercise may be seen as a modest attempt at a methodology in the history of nationalization. This would make the charge of anachronism even less relevant.

III. FINDINGS AND DISCUSSIONS

Table I presents BBS average annual daily unskilled worker wages and matched real wages for 5 industries of Bangladesh during the years 1972/3 to 1976/7, while Table II presents the same data for the corresponding public-sector industries.

As for the BBS data, the weighted wage in 1972/3 in found to be Tk. 5.11, with the corresponding wage in the nationalized sector at Tk. 5.75, there being a divergence of about 11%.

As a result of IWWC award, though declared in January 1974, being implemented with retrospective effect, during 1973/4 *all* public-sector industries were paying unskilled workers the same guaranteed minimum wage including cash fringe benefits. Assuming a month having 26 working days on the average and including guaranteed festival bonus of one month's basic wage per year, daily wage rate for unskilled workers during 1973/4 would be equal to Tk. 8.[8] In 1973/4 unskilled wage rates according to BBS data, at Tk. 5.93 was lower by about 31%.

The next interesting question to be raised is about the real-wage relativity between BBS and public-sector data through the period upto 1976/7, But if, as is presently the case, the same cost of living index is used in deflating both sets of wage data, the relativity in real wage rate in 1976/7 can only be different from that in 1972/3 if the rates of annual wage increase implicit in the two sets of data are divergent. It is therefore a good idea to make explicit the annual rates of increment implicit in the wage rates of Tables I and II, before we convert them to real wage figures.

Appendix Tables 2 and 3 present the two sets of wage increments. Here we stress some aspects of the comparative situation as to annual increases of wage rates.

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[8]Unskilled workers were to have a minimum basic wage of Taka 155, though, after the implementation of IWWC award, many unskilled workers were, on account of their relatively higher basic wage prior to nationalization, placed at higher reaches of the minimum wage scale. Then, all unskilled workers were to have a minimum fringe benefits of Tk. 55.0. Finally, all received, though as a lump-sum the equivalent of Tk. 12.91 per month on account of the guaranteed festival bonuses. As we are concerned with daily guaranteed earnings we added these three components which yields a monthly wage of Tk. 222.91 in 1973/4.

TABLE I

MONEY AND REAL DAILY WAGES OF UNSKILLED WORKERS IN FIVE INDUSTRIES OF BANGLADESH, 1972/3 TO 1976/7 (ALL FIGURES ARE TAKAS)

Year	Money Wages						Cost of Living Index (1972/3=100)	Real Wages[1]					
	Industries							Industries					
	Non-jute							Non-jute					
	Jute	Cotton	Match	Engineering	Edible Oil	All[2] (weighted)		Jute	Cotton	Match	Engineering	Edible Oil	All (weighted)
1972/3	5.09	5.12	5.27	5.32	4.62	5.11	100.00	5.09 (100.0)	5.12 (100.0)	5.27 (100.0)	5.32 (100.0)	4.62 (100.0)	5.11 (100.0)
1973/4	5.71	5.80	6.52	6.96	5.57	5.93	135.06	4.22 (82.9)	4.29 (83.8)	4.83 (91.6)	5.15 (96.8)	4.12 (89.2)	4.39 (85.9)
1974/5	5.94	6.30	7.29	8.68	7.25	6.50	225.54	2.63 (51.7)	2.79 (54.5)	3.23 (61.3)	3.85 (72.4)	3.21 (69.5)	2.88 (56.4)
1975/6	6.20	6.73	7.39	9.11	7.70	6.82	183.97	3.37 (66.2)	3.66 (71.5)	4.02 (76.3)	4.95 (93.0)	4.18 (90.5)	3.71 (72.6)
1976/7	6.89	7.82	8.04	9.15	7.84	7.50	178.46	3.86 (75.8)	4.38 (85.5)	4.50 (85.4)	5.13 (96.4)	4.39 (95.0)	4.20 (82.2)

Note : 1) Parentheses indicate real wage indices.

2) The weights used were proportionate employment shares, obtained from (Bangladesh 1975, Table 10. 1.) Note that the relevant employment figure for edible oil industry was independently estimated at about 12000.

Source : For cols. 1 to 5, Bangladesh for col. 6 (Bangladesh) for cols. 7 to 11, appropriate deflations.

From Appendix Table 2 we find that daily wages have risen at a compound annual rates of 11.1%, 8%, 11.2%, 14.6% and 14.1% between 1972/3 and 1976/7, respectively in cotton, jute match, engineering and edible oil industries. The appropriately weighted average rate of increase in found to be 9.8% for the five industries. Such an average increase in money wage over a period of four years must be regarded as providing a certain extent of protection against erosion of real wages.

As for unskilled workers in nationalized industry, all of whom were time-rated, increments, if any were the only way in which daily guaranteed wage could increase annually. While the BJMC did not adopt annual increments until late 1977, the other corporations gave effect to annual increments from the beginning of 1973/4. We, therefore, have to examine the probable increases in guaranteed money on account of annual increment in basic wage, wherever applicable.

The scale of Tk. 155–5-205-6-235 suggests an annual increase of about 3.22%. However, the ratio of the increase in basic wage to non-bonus guaranteed wage has a lower maximum—only 2.38%. But guaranteed wage has a bonus-component also, which rises at the same rate as the basic wage. The appropriately weighted *maximum* possible rate of increase of non-bonus and bonus-components of guaranteed wage is found to be 3.17% per year.[9]

This is in so far as the non-jute industries are concerned. As the jute industry did not implement the wage *scales* in the first place, the question of increment in wages did not arise at all. On the basis of these arguments in the nationalized sector in the years 1972/3 to 1976/7 are presented in Appendix Table 3. A few observations comparing the rates of wage increase underlying the figures in Tables I and II of the text above may now be made.

First, we find that while, as a result of the award of the IWWC there was a 48.5% increase in jute industry unskilled worker wages, the matched BBS increase is only one of 12.2%. Similarly, the proportionate IWWC-induced wage increase in 1973/4 relative to the year before is 49% for the four non-jute industries shown, the corresponding increase implicit in the BBS data for the relevant industries, though not shown in the table, is 20.8%. The upshot is that, as far as 1973/4 relative to 1972/3 is concerned, unskilled workers in the

[9]The higher is the basic wage, the lower is the rate of increase, as the increment is fixed for ten years and as the environmental support is fixed, too. These *maximum* rates are found on the basis of Tk. 155 and Tk. 55 per month, the *lowest* possible basic wage and fringe benefits. We are therefore overstating the maximal annual increment.

nationalized sectors experienced a rise in wages much higher than the average rise in wages as given by BBS data.

TABLE II

GUARANTEED DAILY MINIMUM WAGES FOR UNSKILLED WORKERS IN FIVE NATIONALIZED INDUSTRIES OF BANGLADESH 1972/3—1976/7
(ALL FIGURES ARE TAKAS)

Year	Money Wage		Cost of Living Index (1972/3 =100)	Real Wage		
	Jute Industry	Non-Jute Industry		Jute Industry[2]	Non-Jute Industry[3]	All Industries (weighted)
1972/73	5.77	5.73	100.0	5.77	5.73	5.75
				(100.0)	(100.0)	
1973/74	8.57	8.57	135.66	6.32	6.32	6.32
				(109.5)	(110.3)	(110.0)
1974/75	8.57	8.78	225.54	3.80	3.89	3.84
				(65.8)	(67.9)	(66.8)
1975/76	8.97[3]	9.39[3]	183.97	4.88	5.10	4.96
				(84.4)	(89.0)	(86.3)
1976/77	9.53	10.16	178.46	5.34	5.69	5.49
				(92.5)	(99.3)	(95.5)

Note : 1. Includes cotton textile, match, engineering and edible oil industries.
2. Parentheses indicate real wage indices.
3. The Government declared a Ration Allowance of Tk. 25 per month in February 1976, which has been in force upto June 1977. These money averages for 1975/6 are obtained by appropriate temporal weighting.

Source : See the text.

Curiously enough, in the year 1974/5 and since the opposite seems to have happened. BBS data for these years show higher increases of wages than those registered for the unskilled worker in the public sector. To take an example, while weighted average percentage rise in public sector wage in 1974/5 versus 1973/4 was a meagre 1.03%, the matched BBS figure is at a high 9.13%. Similarly, the like percentages for 1976/7 are found to be 7.05% and 10.04%—still a difference of 3 percentage points.[10] If the BBS data can be accepted as being reasonably accurate this would suggest that while the nationalized sector protected the worker after 1975/6, the protection was less firm.

[10]The situation of 1975/6 versus 1974/5 is again different in that on the BBS data annual increases are lower than those implicit in the relevant data for the public sector.

But are the BBS data reliable ? We have already aruged that their sampling procedure is inappropriate. More scepticism is aroused when we look at the data of Appendix Table 2 on proportionate annual wage increases according to BBS. There is an excessive annual variation in inter-industry dispersion (measured by coefficient of variation, CV) of annual increments. Thus, for example, the CV of incremental wage rates during 1973/4 versus 1972/3 is at a not implausible 34%, while the very next year it soars to an markedly high level of 63%, while again in the very next year it falls to a low level of 40%, then to rise again to 70% in 1976/7. Further, there appears to be very little relationship between the figures in col. 7 and col. 9, with high values of simple average (col. 7) associating with relatively low value for CV (col. 9), and conversely. Now it is absurd to think that the inter-industry balance, whether in respect of the economic or institutional forces, determining incremental wages, could have been so intensely and unpredictably variable on an annual basis as to have caused the tremendous annual variations in the inter-industry dispersion in incremental wage rates. This renews the misgivings about the nature and temporal coverage of BBS sample, and the changes, if any, in the definitions etc.

It is time now to put in comparative perspective the daily real wage rates in BBS sample and the public enterprises. We find it necessary to separately treat jute and non-jute industries for the present purposes, in that there are considerable variations in inter-industry wage experience as revealed by BBS and IWWC data.

As regards the jute industry, there are significant differences between the BBS and the nationalized industries' data. First, daily wages for the nationalized industry are higher in all the years studied (Tables I and II), while annual increases are correspondingly lower except 1973/4 over 1972/3 and in 1976/7 over 1975/6 (Appendix Tables 3 and 4). As a result, the real wage in 1976/7 with 1972/3 as 100 for the nationalized jute industry is 92.5, as against 75.8 on the basis of BBS data. This (probably) reflects a real difference between the nationalized and the private sector of the industry, and alerts us that average wage data should not be used in analysing the nationalized sector.

An examination of the figures about real wages in non-jute industries shows that the fall in real wages by BBS data is somewhat lower in this case. This is shown by the numbers presented in Table III below, where the focus is on the non-jute sector.

We find from Table III that while real wages in the non-jute nationalized industries remained virtually constant between 1972/3 and 1976/7, the corres-

ponding series based on BBS data is found to register a fall of about 10% during the same period. Again, if the BBS data faithfully capture the movement of industry wide wages, the nationalized sector would appear to have protected its workers, though against a decline that is smaller than that for the jute industry.

Before going to draw implications from the above sets of findings, we may briefly recount the main conclusions. First, BBS wage data are seriously unrepresentative of what has to be considered the single most important component of Bangladesh industry, i.e., the nationalized sector both in respect of annual increases in wages and of the resultant pattern of real wages. Secondly, BBS data on yearly percentage increments show tremendous diversity in their *dispersion* among industries from one year to the next, prompting the natural suspicion that such statistical diversity could not have been caused by any realistic inter-industry balance of economic and/or institutional forces operating on wage levels. The question to arise next is what implications to draw from the foregoing. To this then we now turn.

TABLE III

RELATIVE MOVEMENTS OF DAILY REAL WAGE RATES IN NON-JUTE INDUSTRIES AS REVEALED BY BBS DATA AND PUBLIC SECTOR WAGES

Reference Period	Real Wage Rates per Day	
	BBS Sample	Nationalized Sector
1972/3	5.13	5.73
1973/4	4.59	6.34
	(89.5)	(110.6)
1974/5	3.22	3.89
	(62.7)	(67.9)
1975/6	4.16	5.10
	(81.1)	(89.0)
1976/7	4.62	5.69
	(90.1)	(99.3)

Notes : Figures in parentheses show real wage indices with the value for 1972/3 as the base.

Source : Tables I and II.

IV. IMPLICATIONS

The substantive implication to draw is that BBS data on industrial wages do not form an adequate framework for accurately talking about the real wage levels characteristic of large-scale industry in Bangladesh as far as the early and middle seventies are concerned. Put simply, this is because both nominal and real wage levels implicit in BBS data considerably but unsystematically diverges from those relating to the nationalized industries, which constituted, during the period under review, virtually the entire large-scale sector. We found above that BBS real wage of unskilled workers in 1976/7 versus 1972/3 differed from corresponding wages of worker in nationalized industries by between 10% in the case of non-jute industries to about 17% in that of jute industries. Now in as much as the BBS sample is more *inclusive* than the public sector enterprises, perhaps with a much greater percentage of smaller units, there is nothing unnatural about a steeper rate of decline in real wages than could be assigned to the latter. But the question is about what type of "industry" should one talk about in the context of the discussion of the movement of wage rate as a determinant of the nature of the growth process in a slowly developing economy. Our contention is that the "industry" to be chosen should be one from which by far the greater part of the industrial growth of the period concerned has come. Available evidence about the interesectoral growth shares seems to suggest that large-scale industry has contributed to a greater extent to the country's industrial growth during the quinquennium under review. As such, if one has to study behaviour of real wages in the componant of Bangladesh's industrial sector that has played a dominant role in the growth of manufacturing output, BBS data do not provide the relevant basis and one must focus, instead, on the nationalized sector experience.

The second, but less direct than the foregoing, implication is that there is something curious about the BBS on annual increments of wage rates among the industries concerned, especially as regards the large year-to-year variation in the inter-industry *dispersion* of the measured proportionate increments. It is unbelievable that coefficients of variation ranging between 34% in 1973/4 and 63% (Appendix Table 3) in the very next year for a given sample with *constant industrial, establishment* and personal constituents could possibly represent the operation of economic and institutional factors bearing on inter-industry incremental wages. It must therefore be strongly argued that a part, if not a major part, of this annual unpredictability has *statistical* origins. Although it is impossible to speak with much authority, the possible factors could be : (a) changing proportion and composition of the sample actually

covered, associated with investigator inertia and/or paucity of resources/professional incentives ;[11] (b) the possible derivation by BBS investigators of *daily* wage rates by dividing reported *total* wage payments during the survey month by average attendance, and the associated biases in the resultant ratios as a result of natural entrepreneurial proclivity to over-or under-state total wage payments, depending upon the occasion, to outsiders.[12] In any case, the moral appears to be both clear and important, namely that the practical utility of BBS wage data seems to be quite seriously reduced by its being both unreliable in itself and insufficiently representative of the real wage levels of Bangladesh's large-scale industry.

V. CONCLUSIONS

This paper set out to examine the adequacy of Bangladesh's only published official wage data, due to BBS, as a framework for discussions about real wage levels prevailing in industry in the early and middle seventies. The reason for the choice of the time period of 1972/3—1976/7 has to do, in part, with the fact (a) that the last four years of the above quinquennium were those during which the recommendations of Bangladesh's first wage commission (IWWC) were in force, and (b) that Bangladesh's large-industry during that period was still substantially nationalized,

We have tried to establish that the BBS data on wages are (a) probably not very dependable on their own terms, and (b) more importantly cannot be used to analyse the performance of public-sector enterprises, which constitute arguably the most important sector within large-scale industry.

The empirical part of the paper has hopefully shown (a) that 1972/3 wage levels implicit in BBS data were lower to a considerable extent than the

[11]It has to be noted that the field staff who collect these daily earnings data are administratively responsible to the Director, Survey Wing, BBS, while their processing and publication is the responsibility of the Prices and Wages section under the Director of Industry and Labour Wing of BBS.

[12]Businessmen in Bangladesh are presumably open to the temptation to overstate current outgoings, including wage payments, in order to deflect possible profit taxatian. This would tend to overstate actual wage rates. However, the exact proportionate overstatement made by a given respondent is really an imponderable, depending as much as relative profitability (which is the subject of concealment), as the occasional mood and whims of the persons involved. This could explain part of the unpredictabilities observed.

matched levels of nationalized industries ; (b) that there is just no inkling, going by BBS data, of the very considerable wage gains made by the public sector workers in 1973/4 as a result of the award by IWWC ; (c) that, since 1973/4, percentage annual increments implicit in BBS data have mostly been higher than, as also extraordinarily more variable than, the matched percentages for the public enterprises ; and finally (d) that real wage levels derived from BBS data were lower than, despite liberal measured annual increments, the corresponding levels relating to nationalized industries by anything between 10% to 17%, depending on the type of industry, between 1972/3 and 1976/7. The moral therefore would be that BBS data cannot be regarded by economists and administrators of the country as a natural first choice as the relevant data, if one is interested in asking the type of questions we set out with in this paper.

Appendices

TABLE 1

FRINGE BENEFITS RECOMMENDED BY IWWC, 1973

Fringe benefits (Taka)

Average of Initial and Maximum Stages of Wage Scales	Industrial Area		Non-industrial Area	
	House Rent and Convey-ance Allo-wance	Medical Allow-ance	House Rent and Convey-ance Allow-ance	Medical Allowance
1	2	3	4	5
Less than Tk. 210	40	20	30	20
Not less than Tk. 210 but less than Tk. 320	45	20	35	20
Not less than Tk. 320 but less than Tk. 490	60	20	50	20
Not less than Tk. 490 but less than Tk. 650	90	20	80	20
Not less than Tk. 650	110	20	100	20

Source : (Bangladesh 1973),

TABLE 2

ANNUAL RATE OF INCREASE OF AVERAGE DAILY MONEY WAGE RATES IN BBS DATA IN FIVE INDUSTRIES OF BANGLADESH, 1972/3—1976/7

(Figures, unless otherwise indicated, are annual %s)

Reference Period	Industry Groups					Simple Average for All Industries	Standard Deviation, All Industries	Coefficient of Variation	Weighted Average for All Industries[a]
	Cotton	Jute	Match	Engineering	Edible Oil				
1	2	3	4	5	6	7	8	9	10
1973/4 versus 1972/3	13.28	12.18	23.72	30.82	20.56	20.11	6.89	34	15.85
1974/5 versus 1973/4	8.62	4.02	11.80	24.71	30.16	15.86	9.92	63	9.29
1975/6 versus 1974/5	6.82	4.38	1.37	4.95	6.20	4.74	1.90	40	4.91
1976/7 versus 1975/6	16.19	11.12	8.79	0.44	1.82	7.67	5.87	77	10.13
1976/7 versus 1973/4[b]	10.5	6.5	7.25	9.5	8.5	—	—	—	7.76[c]
1976/7 versus 1972/3[b]	11.1	8.0	11.2	14.6	14.1	—	—	—	9.83[c]

Notes : a) Weights used are industrial shares of total employment in 1972, as given in (Bangladesh 1975 Table 10.1).
b) Figures in this row are annual compound rate of growth.
c) This figure is obtained by weighting the figures in this row, col. 2—6.

Source ; Table I in the text.

TABLE III

ANNUAL RATE OF INCREASE OF AVERAGE DAILY MONEY WAGE RATES IN PUBLIC-SECTOR JUTE AND NON-JUTE INDUSTRIES, BANGLADESH, 1972/3—1976/7

Period	Jute Industry	Non-jute Industry	Weighted Average Increase
1	2	3	4
1973/4 over 1972/3	48.5	49.0	—
1974/5 over 1973/4	0.0	2.4	1.03
1975/6 over 1974/5	4.7	6.9	5.63
1976/7 over 1975/6	6.2	8.2	7.05
1976/7 over 1973/4[a]	3.6	5.8	4.54
1976/7 over 1972/3[a]	13.4	15.4	14 25

Note : a) These figures are annual rates of growth compound. Further to the above, note that inter-industry variation in annual rate of increments is not calculated in the above, because the rate was the same for unskilled workers in all industries that had implemented the system of increments.

Source : Table II in the text.

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Agricultural Wages in Bangladesh before and after the 1974 Famine

by

MARTIN RAVALLION*

Probably the most important immediate cause of starvation during the 1974 famine in Bangladesh was a sharp drop in the food purchasing power of agricultural earnings. Past work has attempted to explain this in terms of conditions in food markets. This paper reports an econometric investigation of wage movements before and after the famine which reveals a significant structural break in the short-run response of wages to prices at the time of the famine. Without this change in labour market conditions real wages would have remained fairly stable during the famine.

I. INTRODUCTION

The rate at which agricultural work exchanged for food fell dramatically in Bangladesh during the 1974 famine and landless agricultural workers and part-time farmers were the famine's main victims (Alamgir 1980 ; Sen 1981). Thus, Sen (1981) attributes the famine to 'trade entitlement failure'. Since the decline in the food wage rate coincided with a substantial increase in rice prices it is natural to look at conditions in rice markets for an explanation of the famine. Indeed, it can be argued that the rice markets could have performed much better in transferring rice from the relatively successful harvests prior to the famine to the lean months (Ravallion 1983).

However, one can also question how well labour markets performed. Certainly the nominal wage rate responded very little to the high rates of rice price inflation during the famine and most other prices remained relatively stable.[1] Was this because money wages in Bangladesh generally respond very little to changes in rice prices or was the famine associated with a disturbance to the equilibrating mechanisms of money wage adjustment ?

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[1] Salt was the main exception, due to a short lived monopoly. The problem seems to have passed by the time the famine arrived in full force (Alamgir 1980).

This paper reports an econometric investigation of the dynamic adjustment of agricultural wages to rice prices in post-Independence Bangladesh. Monthly data is used for the period mid 1972 to mid 1976, including the dramatic changes in rice prices which occurred during the second half of 1974.

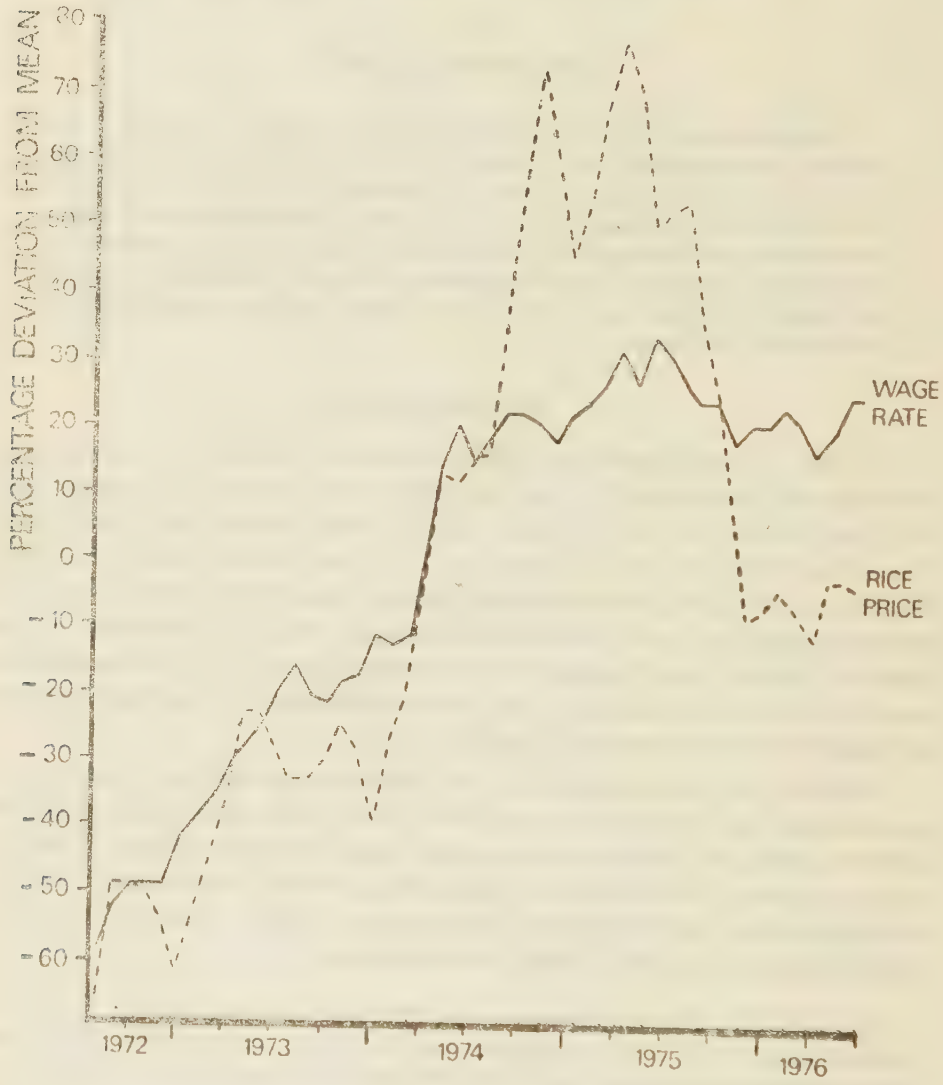

Figure 1

Figure 1 gives the natural logarithms of agricultural wages and the retail price of coarse quality rice, both in mean deviation form. (The data are discussed further in Section III). Casual inspection of Figure 1 suggests some tentative conclusions :

i) Upto mid-1974 wages roughly kept up with rice prices.

ii) The relationship broke down considerably after this point.

iii) The short-run response of wages to prices is asymmetric ; while there is some suggestion of an upward response to price increases, there is little impression of downward flexibility.

The following sections investigate whether these observations are supported by a more careful econometric modelling, taking account of the main seasonal influences on labour demand and the possible simultaneity between wages and prices. Section II outlines the theoretical model. Section III estimates the model for the full sample period, while Section IV gives the results obtained when the period is split into two at July 1974. Section V examines the seasonality in wage-price adjustment. Finally, Section VI examines the influence of the pre-famine model on wage expectations after the famine and demonstrates that this influence can explain the peculiar long-run properties of the post-famine model.

II. A DYNAMIC MODEL OF ASYMMETRIC WAGE ADJUSTMENT

It is assumed that the time series of agricultural wages can be described by the following model :

$$W_t = \alpha_0 + \alpha_1 W_{t-1} + \alpha_2{}^t p_t + \alpha_3{}^t p_{t-1} + \underset{-t}{X}\ \underset{-4}{\alpha} + \mu_t$$

$$(t = 1, \ldots, T) \qquad (1)$$

where W and P denote the natural logarithms of wages and prices, $\underset{-}{X}$ is a vector of other relevant variables and μ is an appropriate error process. The α's are invariant to time except for

$$\overset{t}{\alpha_1} = \delta_t\, \alpha_{10} + (1-\delta_t)\, \alpha_{11} \quad (i=2,3) \qquad (2)$$

where

$$\delta_t = 1 \text{ if } dP_t > 0$$
$$= 0 \text{ otherwise}$$

Thus, the response of the wage rate to a price increase need not equal its response to a fall in price. Equation 1 can also be written in the equivalent form :

$$dW_t = \alpha_0 + (\alpha_1 - 1)\, RW_{t-1} + \alpha_2{}^t\, dP_t + (\alpha_1 + \alpha_2{}^t + \alpha_3{}^t - 1)P_{t-1} + \underset{-t}{X}\ \underset{-4}{\alpha} + \mu_t \qquad (3)$$

where $RW \equiv W - P$ is the log of the real food wage rate. As an econometric specification, this form reduces the likely correlations amongst the regressors in equation 1 thus permitting more efficient estimation. Using equation 2 the model can be written in a form which is linear in the time invariant parameters, namely :

$$dW_t = \alpha_0 + (\alpha_1 - 1)RW_{t-1} + \alpha_{20}\delta_t\, dP_t + \alpha_{21}(1-\delta_t)dP_t + (\alpha_1 + \alpha_{21} + \alpha_{31} - 1)P_{t-1} + (\alpha_{20} + \alpha_{30} - \alpha_{21} - \alpha_{31})\delta_t\, P_{t-1} + \underline{X}_t\, \underline{\alpha}_4 + \mu_t \quad (4)$$

There is a restricted form of equation 1 of special interest. Consider a long-run equilibrium in which W and P are stationary for a given value of $\underline{X}$. If equation 1 holds in such an equilibrium then

$$RW = (\alpha_0 + (\alpha_1 + \alpha_{21} + \alpha_{31} - 1)P + \underline{X}\underline{\alpha}_4)/(1 - \alpha_1) \quad (5)$$

and so

$$\alpha_1 + \alpha_{21} + \alpha_{31} - 1 = \alpha_{20} + \alpha_{30} - \alpha_{21} - \alpha_{31} = 0 \quad (6)$$

given that RW is also stationary and noting that it is arbitrary whether one defines δ to be 0 or 1 when $dP = 0$. Thus, if equation 1 is constrained (on *a priori* grounds) to be consistent with long-run equilibrium then equation 4 becomes

$$dW_t = \alpha_0 + (\alpha_1 - 1)\, RW_{t-1} + \alpha_2{}^t dP_t + \underline{X}_t\, \underline{\alpha}_4 + \mu_t \quad (7)$$

In the special case of a symmetric wage response to a price change ($\alpha_2{}^t = \alpha_2$, $\alpha_3{}^t = \alpha_3$, say) one obtains :

$$dW_t = \alpha_0 + (\alpha_1 - 1)RW_{t-1} + \alpha_2 dP_t + \underline{X}_t\, \underline{\alpha}_4 + \mu_t \quad (8)$$

This form has been proposed and estimated using data for some developed countries by Sargan (1964) and others.[2] Of course, the restrictions embodied in equations 7 and 8 are testable by first estimating the unrestricted version given by equation 4.

III. AGRICULTURAL WAGE ADJUSTMENT IN BANGLADESH, 1972-75

Monthly rice prices are monitored at markets throughout Bangladesh by the Bangladesh Directorate of Agricultural Marketing. Also the Bangladesh Directorate of Agriculture compiles a comparable, although probably less accurate,

[2] See Hendry, Pagan and Sargan (1983) for a detailed discussion of econometric models using error correction mechanisms. Also see Harvey (1981). Models of this form can be given a dynamic choice theoretic basis ; see Salmon (1982).

series for the average daily cash wage of agricultural labourers.[3] Alamgir *et al.* (1977) have compiled these data for the period July 1972 to June 1976 which is the source of the data used here.

As is common, monthly data is not available on agricultural employment and labour supply for Bangladesh. The omission of employment, particularly at harvest time, is likely to bias estimates of the wage response to prices (via the likely negative correlation between harvest employment and harvest price). For this reason, an attempt has been made in the present study to take account of the seasonal variation in labour demand (and prices) using monthly dummy variables. All regressions initially included 11 monthly dummy variables and these were subsequently eliminated one by one in increasing order of absolute t-ratio up to unity. On the basis of the typical crop calendar for Bangladesh one would expect the main seasonal peaks in labour demand to be April-May which is simultaneously the time of sowing the *aus* rice and harvesting the *boro* rice and the period mid-November to mid-January which is the harvest of the main crop for the year, the *aman* rice. Other regressors described important a-typical events during the four year period, the most important being a dummy variable for the 1974 famine.

Current prices in the wage equation were instrumented by the following OLS estimate of the average retail price of coarse quality rice (absolute t-ratios in parentheses) :

$$\begin{array}{llllll} \hat{P} = .17 & + & .96P_{-1} & + .24\text{FAM 74} & - & .06\ (\text{NOV}+\text{DEC}) \\ \quad (1.2) & + & (32) & \quad (4.4) & & \quad (1.8) \\ + .10\text{MAR} & + & .15\text{AP} & + .11\text{JAN} & + & .13\text{AUG} \\ \quad (2.7) & & \quad (3.3) & \quad (2.8) & & \quad (2.9) \\ + .09\text{FEB} & - & .29\text{NOV74} & - .26\text{AUG75} & - & .16\text{AP75} \\ \quad (2.2) & & \quad (3.1) & \quad (3.1) & & \quad (1.9) \end{array} \qquad (9)$$

$R^2 = .98$ $F(11, 35) = 134$ SEE $= .07$ $n = 47$
Mean $(P) = 4.8$ D-W $= 1.51$

[3] Bose (1968) discusses the methods of collection and limitations of these data. Sampling biases are thought to be large in the underlying district and sub-district level data, but this is less of a problem in the national series. There does not appear to be any good reason for rejecting the assumption that errors in the wage series are white noise (in which case they will not bias estimation), although one might suppose that the (unobserved) meals given to many agricultural workers might be diminished in time of rice shortage. This is another reason for instrumenting current price in the wage equation.

Dummy variables for each month are denoted NOV, DEC etc. FAM74 is a dummy variable for the worst months of the 1974 famine, namely August, September and October. Three significant dates have also been singled out : November 1974 saw a sharp jump in imports (mainly aid) over the previous two months together with the arrival of the winter's rice (Alamgir *et al.* 1977). Substantial falls in private stocks in November 1974 at the end of the famine have also been reported (Stepanek 1979). The assassination of Prime Minister (then President) Mujibur Rahman in August 1974 is also thought to have resulted in a sharp fall in private stocks (McHenry and Bird 1977), and this is borne out in equation 9. Finally, April 1975 saw the introduction (for the first time) of compulsory procurement of the *boro* rice and this was announced about two weeks prior to the start of procurement.

The corresponding IV estimates of α_{21} and $\alpha_{20}+\alpha_{30}-\alpha_{21}-\alpha_{31}$ in equation 4 were found to be highly insignificant (t-ratios of .001 and .35 respectively). On setting these coefficients to zero, the following result was obtained :

$$\hat{dw}=.05-.31RW_{-1}+.35\delta\hat{dP}-.23P_{-1}$$
$$(.78)\quad(3.5)\quad(4.7)\quad(3.4)$$
$$-.06FAM74+.07MAY-.020CT+.03DEC$$
$$(2.6)\quad(3.9)\quad(1.5)\quad(2.0)$$
$$+.06TIME \qquad (10)$$
$$(2.6)$$
$$SEE=.30E-1,\ MeanW=1.95,\ n=46$$
$$SSR=.34E-1,\ D-W=1.63$$

TIME denotes the natural log of the number of months since July 1972. The dummy variable for May was set to zero for 1973 in view of the drought and subsequent flooding which occurred at that time and the consequent drop in employment (particularly in harvesting the much depleted 1973 *boro* crop). The drop in wages in October reflects the usual lean period between transplanting and harvesting the *aman* rice. The wage increase in December reflects the extra demand for labour at the *aman* harvest. The decline in rural employment and weakened bargaining position of workers resulted (*ceteris paribus*) in a rate of wage decline of six per cent per month during the 1974 famine.

The above results indicate a strong autocorrelation in the wage series ($\hat{\alpha}_1=$ .69, with at-ratio of 18). In the short-run, wages respond to prices with an upward elasticity of .35 but with zero downward elasticity. Furthermore, the short-run dynamic adjustment of wages is not consistent with the assumed conditions for long-run equilibrium. The following sections will attempt to explain why.

IV. WAGE ADJUSTMENT BEFORE AND AFTER THE FAMINE

It seems plausible that the 1974 famine could have (at least temporarily) displaced the short-run wage adjustment process. In addition to its identified effects on food prices, the famine is likely to have considerably weakened workers' bargaining power. For example, Clay's (1976) survey of labourers at the harvesting of the 1975/76 *aman* crop in the Joydebpur area suggests that the labour market at the time was in a state of transition, due in part to the influence of the new migrant labour after the famine.

To test this proposition, Table I gives the estimates of equation 4 obtained by splitting the sample into two periods :

1. The 'pre-famine' period ; up to and including July 1974 (n=23).
2. The famine and post-famine period ; August 1974 on (n=22).

The cut off point was decided on the basis of the history of the famine period—see Alamgir, 1980—and a visual inspection of Figure 1. The corresponding price instruments are given in the Appendix.

Comparison of the two equations indicates that the famine was associated with a clear structural break in the wage adjustment process. This is indicated by the χ^2 test using the pre-famine model's post-sample predictive errors (Table I) and was also revealed using a Chow test based on the sum of squared residuals of the unrestricted models. As was found in the full-sample model, the short-run wage response is asymmetric in both sub-periods (both estimates of α_{21} were highly insignificant). However, the implied elasticity of wages to a rice price increase (α_{20}) is substantially greater in the pre-famine model,[4] as is the wage autoregression coefficient ($\hat{\alpha}_1$=.69 with a t-ratio of 9.0 in the pre-famine model while $\hat{\alpha}_1$=.45 with t=4.3 in the second period). Unlike the full-sample model, reasonably strong first-order autoregression of the errors (and of opposite signs) was found in the two sub-periods and this has been modelled explicitly in the estimates in Table I. However, no significant time trend remaind in the wage series for either sub-period.

In contrast to the post–July 1974 model, the short-run adjustment process in the pre-famine model is consistent with the conditions for long-run equilibrium (the estimate of $\alpha_1+\alpha_{21}+\alpha_{31}-1$ had a t-ratio of .07). The long-run

[4] The t test for the twin null hypotheses that the estimate of α_{20} for each sub-period is equal to the estimate obtained for the other period are 2.5 and 4.3 respectively and both hypotheses are rejected at the 5 per cent level.

real wage rate is estimated by solving for $RW^*=W_t-P_t=W_{t-1}-P_{t-1}$ with $dW_t=dP_t=0$ and is given by :[5]

$$RW^*= \underset{(51)}{-2.74} + \underset{(2.6)}{.06MAY} + \underset{(2.5)}{.04JY} + \underset{(4.0)}{.07DEC} \qquad (11)$$

TABLE I

WAGE ADJUSTMENT BEFORE AND AFTER THE 1974 FAMINE

Variable	Parameter	1 Pre-famine (to July 1974)	2 Famine and Post-famine
1	α_0	— .85	.91
		(4.0)	(4.9)
RW_{-1}	α_1-1	— .31	— .55
		(4.0)	(5.3)
$\hat{\delta dP}$	α_{20}	.63	.35
		(5.6)	(5.4)
P_{-1}	$\alpha_1+\alpha_{21}+\alpha_{31}-1$	0	— .50
			(5.2)
$Error_{-1}$	ρ	.49	— .59
		(2.1)	(2.6)
SEE		.24E—1	.17E—1
Meap W		1.77	2.19
n		23	22
SSR		.98E—2	.33E—2
D—W		1.60	2.40
$\chi^2(6)$		84	n—a

Note : I.V. estimates of equation 4 (see Appendix) ; absolute t-ratios in parentheses. Specification 1 included dummy variables for May, December and July, while 2 included February, April, May, July, September, October and FAM74.

[5] The general formula for long-run real wage rate given X^* is

$$RW^* = (\alpha_0 + \underset{-}{X^*}\underset{-4}{\alpha})/(1-\alpha_1)$$

The standard error of $\alpha_0/(1-\alpha_1)$ and other non-linear functions of parameters have been estimated by taking a first-order approximation in the neighbourhood of the parameter estimates.

The implied value of the long-run real wage rate in units of coarse quality rice is 5.3 pounds per day in the lean months (i.e., excluding May, July and December). The actual real wages during the months of August, September and October of 1974 were 4.2, 3.3 and 2.8 pounds of rice per day respectively. Thus, by October 1974 the real wage rate had fallen to 52 per cent of its long-run value, as predicted from the conditions found prior to August 1974.

TABLE II

PREDICTED CHANGES IN THE RICE WAGE DURING THE FAMINE BASED ON THE PRE-FAMINE MODEL

Month in 1974	Actual dRW (%)	Predicted dRW (%)	Components of predicted dRW			
			$-dP$	$\alpha_{20}dP$	$\alpha_0+(\alpha_1-1)RW_{-1}$	$\rho error_{-1}$
August	—16	—5	—19	12	2	0
September	—23	—6	—22	14	7	—5
October	—18	0	—17	11	14	—8

Note : Predicted values assume that the previous month's wage rate is known. Dynamic forecasting using only the wage rates prior to August gives higher forecasting errors in all months.

It is of interest to compare the actual wage rates during the famine with the wages one would have expected if there had not been a structural break in the wage equation. Table II gives the predicted values of dRW during August, September and October of 1974 based on the pre-famine model in Table I. The rice wage rate actually fell by almost sixty per cent during the quarter. However, the pre-famine model predicts a fairly stable rice wage over the period. This is due both to the higher elasticity of the money wage to rice price and the higher wage autocorrelation found under the pre-famine conditions.

V. SEASONALITY IN WAGE ADJUSTMENT

If the parameters of equation 1 vary across seasons such that wages are relatively sticky in the lean months then this could explain the poor post-sample predictive ability of the pre-famine model in Table I. Thus, the model's predictive errors for the relatively lean months of August, September and October of 1974 could reflect model misspecification rather than a structural break.

To test this explanation, suppose that α_{20} is a linear function of a variable AUT which takes the value 1 in August, September and October, but is set to zero otherwise. (One might also suppose that α_1 has a similar seasonal component. However this effect did not prove to be significant.)

The corresponding estimate of the pre-famine model is as follows :

$$\hat{dW} = \underset{(4.7)}{-.96} - \underset{(4.7)}{.34}RW_{-1} + \underset{(6.4)}{(.71} - \underset{(2.0)}{.46}AUT)\delta\hat{dP} + \underset{(3.0)}{.07}MAY + \underset{(2.5)}{.04}JY + \underset{(4.5)}{.07}DEC + \underset{(2.3)}{.48}Error_{-1}$$

$$SEE = .22E-1 \quad SSR = .78E-2 \quad D-W = 1.64$$

A mildly significant seasonal dimension in the short-run wage response is obtained and this permits a slight improvement in the model's within-sample performance. Not suprisingly, the new model has lower post-sample predictive errors for the months of August, September and October of 1974. (The predicted changes in the real wage corresponding to Table II are -9, -7 and -2 per cent.) However, the predicted real wage is still over 50 per cent higher than the actual by October 1974 and the Chi-square test on the post-sample errors continues to indicate a significant structural break. (For example, $\chi^2(3)=99$.) The structural break cannot be plausibly attributed to misspecification of the seasonal dimension in wage adjustment.

VI. THE INFLUENCE OF THE PRE-FAMINE MODEL ON POST-FAMINE WAGE EXPECTATIONS

There is one possible explanation for the peculiar long-run behaviour of the wage equation after the famine. Geographic mobility and other forms of social disruption in the period would have left many workers in unfamiliar settings. Furthermore, there is little unionization amongst rural workers in Bangladesh. Thus it can be safely assumed that it was unusually costly for individual workers to obtain information about the new wage adjustment process during and probably for some time after the famine.

In this case, a considerable time is likely to have elapsed before wage expectations had adjusted to conform with the new model. Then wages in the post-famine period will also depend on wage expectations formed using the pre-famine model but based on current prices.[6] Failure to consider this effect

[6]The idea to test for this possibility arose out of discussions with Abhijit Sen.

would produce omitted variable bias in the main parameters including the error correction coefficient.

Following this explanation suppose that (instead of equation 1) :

$$W_t = \alpha_0 + \alpha_1 W_{t-1} + \alpha_2{}^t p_t + \alpha_3{}^t p_{t-1} + \alpha_4 W^*_t + \alpha_5 W^*_{t-1} + \underset{-t\ -6}{X\ \alpha} + \mu_t \qquad (12)$$

where W* denotes the expected value of the wage rate on the basis of the current price information but using the pre-famine model. On separating out the error correction term :

$$dW_t = \alpha_0 + (\alpha_1 - 1)RW_{t-1} + \alpha_2{}^t dP_t + (\alpha_4+\alpha_5)RW^*_{t-1} + \alpha_4 dW_t^* + (\alpha_1+\alpha_2{}^t+\alpha_3{}^t+\alpha_4+\alpha_5-1)P_{t\ 1} + \underset{-t\ \ 6}{X\ \alpha} + \mu_t \qquad (13)$$

The following result was obtained by applying the same estimation methods as in the previous section to equation 13 :

$$\begin{aligned} dW &= 1.17 - .80RW_{-1} + .14\delta\hat{dP} \\ &\quad (6.4) \quad (6.8) \quad (2.1) \\ &+ .44RW^*_{-1} + .46dW^* + .05MAY \\ &\quad (6.7) \quad (7.1) \quad (4.8) \\ &- .02JY - .04FAM74 - .02OCT \\ &\quad (1.5) \quad (3.1) \quad -(1.4) \end{aligned} \qquad (14)$$

SEE. = .14E−1 Mean W=2.19 n=22

SSR = .27E−2 D−W =2.4 ρ=−.49 (2.1)

Under this specification, the long-run wage elasticity is now unity (The coefficient on P_{-1} had a t-ratio of 0.2). Predictions of the current wage rate based on the pre-famine model have a significant effect on post-famine wages and, once an allowance is made for this effect, the short-run wage adjustment process is found to be consistent with the condition for long-run equilibrium.

VII. CONCLUSIONS

Past assumptions about the short-run elasticity of nominal wages to rice prices in Bangladesh have varied widely. For example, Ahmed (1981) considers a figure of 0.9 to be reasonable, while Mahmud (1982) prefers 0.35 or zero. A number of choices about development policy seem to depend quite crucially on the value of this parameter and it is clearly an important determinant of the vulnerability of the rural poor to food crises such as the 1974 famine.

The results of this paper indicate a significant structural break in the short-run wage adjustment process in Bangladesh before and after the 1974 famine. For the data prior to August 1974, the short-run elasticity with respect to a price increase is estimated to be .63, while the figure is .35 when estimated on an identical basis for the second period. However, when an allowance is made for the likely influence of the pre-famine model on post-famine wage expectations, the short-run elasticity for the post-famine data is .14 rising to .43 once wage expectations have adjusted to the price increase. Without this structural break in the model, the real wage rate in units of rice would have been almost twice as high during the worst months of the famine.

Recent efforts to understand the causes of the 1974 famine have tended to emphasize conditions in rice markets. Such is the case with the popular but discredited view that famines are due to a decline in aggregate foodgrain availability. But it is also true of other explanations that have been put forward for the Bangladesh famine, such as 'excessive hoarding' by private rice traders and inadequate government foodgrain stocks.

The present results suggest that conditions in labour markets are also important to a proper understanding of the events of 1974. However, it is not enough to identify a structural break in the dynamic adjustment of wages to prices during the famine. A satisfactory understanding of the causes of the famine demands a convincing explanation for the structural break. There are some possible clues : substantial increases in landlessness in areas hit badly by the famine have been reported by Alamgir (1980) and there is also evidence that local labour markets might have been considerably disrupted in the post-famine period by the appearance of large numbers of new (intra-national) migrant workers (Clay 1976). But these observations do not add up to a finished story —the landlessness explanation, for example, begs the question of who bought the land and how much extra demand for hired labour resulted. An important property of the data has been identified. It remains to be explained.

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Appendix

The following instrument was used for P in the pre-August 1974 model (equation 11) :

$$\hat{P} = .13 + .97P_{-1} - .08(NOV+DEC) - .03D73$$
$$(.51)\quad (17)\quad (2.5)\quad (1.0)$$
$$+ .13MAR + .16AP + .12JAN$$
$$(3.6)\quad (4.1)\quad (2.9)$$
$$+ .07AUG + .08FEB \qquad \text{A1}$$
$$(1.7)\quad (2.0)$$

$R^2 = .97$ $F(8,15) = 68$ SEE $= .03$ Mean (P) $= 4.5$
D–W $= 1.48$

The post-August 1974 model used the following instrument :

$$\hat{P} = .07 + .99P_{-1} + .24FAM74 - .12\,(NOV+DEC)$$
$$(.20)\quad (14)\quad (3.2)\quad (2.0)$$
$$- .14MAY + .16AUG - .14OCT - .31NOV74$$
$$(2.0)\quad (1.7)\quad (1.9)\quad (2.4)$$
$$- .36AUG75 - .09AP75 \qquad \text{A2}$$
$$(2.8)\quad (.92)$$

$R^2 = .95$ $F(9,13) = 29$ SEE $= .09$ Mean(P) $= 5.1$
D–W $= 1{\cdot}67$

Note

Complete Consumer Model : A Preliminary Estimate for Bangladesh*

by

OMAR HAIDER CHOWDHURY*

I. INTRODUCTION

Methods have been developed to estimate demand clasticities with respect to price from the knowledge of budget proportions, Engel elasticities and income elasticity of marginal utility of income for want-independent goods. Application of these methods in econometric research is growing in ever increasing volume as this technique is very useful where little price information is available. Ragnar Frisch (1959) has developed a method for computing all direct and cross demand elasticities under conditions of want independence. Standard error for such estimates are not obtainable. Hence Robert Ayanian (1969) has compared the performance of this method with that of Barten (1964) for which standard errors were available and found that both the studies produced similar estimates. Hence he concluded that Frisch's method for the determination of all direct and cross demand elasticities should be of great value in the areas where little price data is available. In this paper we essentially use Frisch's methodology to compute all direct and cross demand elasticities for various commodities and commodity groups for Bangladesh. Contrary to skeptical views expressed in an earlier study (Alamgir and Berlage 1973) in this field we report some encouraging results in this paper.

Rest of the paper consists of a brief discussion of the theory, data, and methodology applied followed by concluding remarks.

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II. THEORY

Both Frisch and Barten begin with the classical theory of consumer behaviour and then procede to specify the utility function in the directions of additive preferences, or want independence. Want independence according to Frisch for good i and k ($i \neq k$) means that the marginal utility of good i depends on the quantity of good i, and not on the quantity of any another good.

Both Frisch and Barten utilise the concept of money flexibility to express demand elasticities in terms of Engel elasticities and budget proportions. Frisch represent the money flexibility by $\hat{W}$:

$$\hat{W} = \frac{dW}{dy} \cdot \frac{Y}{W} \qquad \ldots \qquad (1)$$

When, Y is the income of a consumer unit and W is the marginal utility of money of the consumer unit.

In developing his equations, Barten uses the reciprocal of money flexibility which he calls $P: 1/p = \hat{W}$ which he says is income elasticity of the marginal utility of money. We essentially use Frisch's technique as an estimation procedure where he derives the following computational formulas, for direct and cross demand elasticities, which are applicable when $\hat{W}$ is known and under conditions of want independence.

$$e_{ii} = -E_i \left(a_i - \frac{1 - a_i E_i}{\hat{W}} \right) \qquad \ldots \qquad (2)$$

(good i is want-independent of all other goods)

$$e_{ik} = -E_i a_k \left(1 + \frac{E_k}{\hat{W}} \right), \; i \neq k \qquad \ldots \qquad (3)$$

(good i and k are want-independent for this particular i, k combinations), where e_{ii} is the direct demand elasticity with respect to price, e_{ik} is cross demand elasticity with respect to price, a_i is the budget proportion of the ith good, and E_i is the income elasticity of the ith good.

III. ENGEL ELASTICITY

From the static theory of consumer demand it is known that the demand for each commodity can be written as a function of the total consumer income

and all market prices. If prices are held constant then demand can be expressed solely as a function of consumer's income :

$$X_1 = f(y) \quad \ldots \quad (4)$$

This relationship is generally known as consumer's Engel curve for each commodity where x_1 is the quantity of commodity i consumed and y is the income of the consumer. Indeed, referring to equation (4), it should be clear that Engel curves are demand equations in which all prices are supposed to be constant. The effect of education, occupation, cultural background, age, sex etc. are assumed away in this formulation. Since prices are assumed constant it is necessary that the period covered should be short. Hence we have used Household Expenditure survey data for 1974 for our estimation of Engel elasticities,

Quantity or expenditure on the commodity may be used as the dependent variable. One advantage of using expenditure as the dependent variable is that one can form composite commodity such as dairy produce, poultry etc. or can estimate elasticity for recreation or such other commodities for which no quantitative expression can be used. Expenditures on commodities or commodity groups will be used as the dependent variables in our case.

Expenditure pattern of a household or an individual depends in a complicated way on past, present and expected incomes. Therefore, precise formulations of income as the determining variable is bound to be complicated and very difficult. On the other hand, the distribution of expenditures on the commodities depends only on the level of total expenditures. Therefore, we shall use total expenditures as our independent variable instead of income.

Per capita relationships are assumed to be related to a "representative" consumer whose behaviour is supposed to reflect average behaviour of the population as postulated in the theory of individual consumer. Houthakker and Taylor (1970, p. 29) have shown that per capita relationships are more meaningful and stable than relationships between aggregates. Hence our analysis will be carried out in per capita terms.

A priori it is difficult to suggest as to which functional form should be used for estimating Engel elasticities. Alternative functional forms refer to differeent hypotheses regarding income elasticity or the marginal propensity to consume. In practice, the form that suits the purposes for which the estimates are required is chosen. In our case we need an estimate of the income elasticity and as such the log-linear form would suggest itself as the most suitable

form as we can get it straight away as an estimated parameter of the function. Again the log-linear form has the desirable theoretical property of being asymptotic to both the axes. In fact we shall argue along with Houthakker (1965, p. 278) that "despite its (log-linear function) well-known defects, especially that of non-additivity this function remains without serious rivals in respect of goodness of fit, ease of estimation and immediacy of interpretation". Therefore, we will use the log-linear specification for estimating Engel elasticities.

IV. DATA AND METHODOLOGY

Expenditure on commodities by different income groups are reported in the Household Expenditure Survey conducted by the Bangladesh Bureau of Statistics in 1974. Total number of members in an average household for each income group is also reported in the survey along with total expenditures. Hence, it was very easy to calculate per capita total expenditure as well as per capita expenditure on each item for different income groups from information available in the survey as reported in Appendix Table 1 for Bangladesh (rural and urban combined).

Twenty five groups of commodities and services are considered for our analysis. Average budget shares of the commodities and services as estimated from the survey report are produced in Table II.

As discussed earlier the following log-linear specification is used for estimating Engel elasticities.

$$\log q_i = b + E_1 \log Y + u_1 \quad \ldots \quad (5)$$

where q_1 is per capita expenditure on commodities i, y is per capita income (per capita total expenditure in our case), E_1 is Engel elasticity, b is any constant and u_1 is the random disturbance term.

Table I reports the results of the fit. It is clear that the fit is generally good and the income coefficient is significant at more than 95% level for 20 out of 25 cases.

TABLE I

ENGEL CURVES

Commodities	Constant	Co-efficient of Income	R^2	Degrees of Freedom
1. Cereals	0.318	0.810@ (14.2)	0.95	11
2. Pulses	—4.212	1.132* (36.52)	0.99	11
3. Milk	—4.657	1.074* (3.32)	0.46	11
4. Milk Products	—4.158	0.324 (0.43)	0.02	11
5. Edible Oil	—3.602	(1.082*) (10.64)	0.90	11
6. Mutton	—4.760	0.78 (1.32)	0.14	11
7. Beef	—5.759	1.032** (2.21)	0.29	11
8. Fish	—3.983	1.209* (10.16)	0.90	11
9. Chicken	—6.149	1.175* (3.30)	0.36	11
10 Eggs	—3.514	0.496 (1.55)	0.18	11
11. Potato	—6.547	1.300* (9.35)	0.88	11
12. Onion	—5.076	1.091* (8.35)	0.94	11
13. Vegetables	—0.937	0.404* (5.77)	0-76	11
14. Fruits	—3.528	0.702* (6.72)	0.35	11
15. Salt	—0.400	0.692* (5.23)	0.66	11
16. Spices	—5.329	1.443* (6.53)	0.81	11

(*Contd.*)

TABLE I (*Contd.*)

Commodities	Constant	Co-efficient of Income	R^2	Degrees of Freedom
17. Sugar (mill-made)	—6.812	1.247** (2.18)	0.28	11
18. Cigarettes	—6.419	1.230** (2.16)	0.27	11
19. Tea	—7.21	1.128 (1.90)	0.18	11
20. Clothing	—4.043	1.220* (11.40)	0.92	11
21. Foot-wear	—6.40	0.981 (1.76)	0.20	11
22. Personal effects (undurable	—11.147	1.920* (13.62)	0.94	11
23. Rent	—1.688	0.715* (14.08)	0.94	11
24. Fuel and light	—0.601	0.601* (9.25)	0.88	11
25. Furniture and utensils	—4.214	0.753* (12.55	0.93	11

Notes : 1) t values in the parentheses
2) * and ** refer to levels of significance at 99% and 95% respectively.

TABLE II

AVERAGE BUDGET SHARES

Commodities	Average Budget Shares
1. Cereals	0.43558
2. Pulses	0.02673
3. Milk	0.01788
4. Milk products	0.00082
5. Edible Oil	0.03902
6. Mutton	0.00378
7. Beef	0.00503
8. Fish	0.05032
9. Chicken	0.00659
10. Eggs	0.00326
11. Potato	0.00671
12. Onion	0.00901
13. Vegetables	0.02519
14. Fruits	0.00883
15. Salt	0.00402
16. Spices	0.04223
17. Sugar (mill-made)	0.00485
18. Cigarettes	0.00617
19. Tea	0.00180
20. Clothing	0.05086
21. Foot-wear	0.00200
22. Personal effects (non-durable)	0.00120
23. Rent	0.05228
24. Fuel and light	0.08013
25. Furniture and utensils	0-00499

Source : Estimated from Appendix Table 1.

V. PRICE ELASTICITIES

Equations (2) and (3) show that given $\hat{W}$ all direct and cross demand elasticities with respect to price can be computed from information on Engel elasticities and average budget shares of commodities. Engel elasticities of the commodities are available from Table I and Table II gives their average budget shares. Recently $\hat{W}$ was estimated to be -2.541 for Bangladesh from consumer behaviour (Chowdhury 1981). Hence we have all the necessary information to estimate all the direct and cross elasticities by applying formulas (2) and (3). Table III below reports the estimated direct and cross demand elasticities with respect to price for various commodities of Bangladesh.

TABLE III

ALL DIRECT AND CROSS DEMAND ELASTICITIES

	Cereals	Pulses	Milk	Milk Products	Edible Oil	Mutton	Beef	Fish	Chicken
	1	2	3	4	5	6	7	8	9
1. Cereals	—0.55912	—0.01200	—0.00836	—.00058	—0.01815	—0.00212	0.00242	—0.02137	—0.00287
2. Pulses	—0.29673	—0.01482	—0.01032	—0.00072	—0.02241	—0 00262	—0.00299	—0.02638	—0.00354
3. Milk	—.31869	—0.01592	—0.43376	—0.00077	—0.02407	—0.00281	—0.00321	—0.02833	—0.00380
4. Milk-products	—.09614	—0.00480	—0.00335	—0.12774	—0.00726	—0.00085	—0.00097	—0.00855	—0.00115
5. Edible oil	—.32106	—0.01604	—0.01117	—0.00077	—0.45006	—0.00284	—0.00324	—0.02854	—0.00383
6. Mutton	—0.23144	—0.01156	—0.00805	—0.00056	—0.01748	—0.30901	—0.00233	—0.02058	—0.00276
7. Beef	—.30623	—0.01529	—0.01065	—0.00074	—0.02313	—0.00270	—0.40922	—0.02722	—0.00365
8. Fish	—.35875	—0.01792	—0.01248	—0.00087	—0.02709	—0.00317	—0.00362	—0.50768	—0.00428
9. Chicken	—.34866	—0.01741	—0.01213	—0.00085	—0.02633	—0.00308	—0.00351	—0.03100	—0.46658
10. Eggs	—.14718	—0.00735	—0.00512	—0.00036	—0.01112	—0.00130	—0.00148	—0.00131	—0.00176
11. Patato	—.38575	—0.01927	—0.01342	—0.00094	—0.02913	—0.00341	—0.00359	—0.03429	—0.00460
12. Onion	—0.32373	—0.01617	—0.01126	—0.00079	—0.02445	—0.00286	—0.00326	—0.02878	—0.00386
13. Vegetables	—.11988	—0.00599	—0.00417	—0.00029	—0.00905	—0.00106	—0.00121	—0.01066	—0.00143
14. Fruits	—.20830	—0.01040	—0.00725	—0.00051	—0.001573	—0.00184	—0.00210	—0.01852	—0.00249
15. Salt	—.20534	—0.01026	—0.00714	—0.00050	—0.01551	—0.00181	—0.00207	—0.01826	—0.00245
16. Spices	—.42818	—0.02139	—0.01489	—0.00104	—0 03234	—0.00378	—0.00432	—0.03807	—0.00511
17. Sugar	—0.37002	—0.01848	—0.01287	—0.00090	—0.02795	—0.00327	—0.00373	—0.03290	—0.00441
18. Cigarettes	—.36498	—0.01823	—0.01269	—0.00089	—0.02756	—0.00322	—0.00368	—0.03245	—0.00435
19. Tea	—.33471	—0.01672	—.01164	—0.00081	—0.02528	—0.00296	—0.00337	—0.02976	—0.00399
20. Clothing	—.36201	—0.01808	—0.01259	—0.00088	—0.02734	—0.00320	—0.00365	—0.03218	—0.00432
21. Footwear	—.29109	—0.01454	—0.01012	—0.00071	—0.02198	—0.00257	—0.00293	—0.02588	—0.00347
22. Nondurable	—.56972	— .02845	—0.01981	—0.00138	—0.04303	—0.00503	—0·00574	—0.05065	—0.00680
23. Rent	—.21216	—0.01060	—0.00738	—0.00052	—0.01602	—0.00187	—0.00214	—0.01886	—0.00253
24. Fuels light	—0.17834	—0.00891	—0.00620	—0.00043	—0.01347	—0.00158	—0.00180	—0.01585	—0.00213
25. Furniture and Utensils	—.22344	—0.01116	—0.00777	—0.00054	—0.01688	—0.00197	—0.00225	—0.01986	—0.00267

(*Contd.*)

TABLE III (*Contd.*)

Eggs	Potato	Onion	Vegetables	Fruits	Salt	Spices	Sugar	Cigarettes	Tea	Clothing
10	11	12	13	14	15	16	17	18	19	20
—0.00212	—0.00266	—0.00416	—0.01716	—.00518	—.00328	—0.01478	—0.00200	—0.00258	—0.00081	—0.02142
—0.00262	—0.00328	—0.00514	—0.02119	—0.00639	—0.00293	—0.01825	—0.00247	—0.00318	—0.00100	—0.02644
—0.00281	—0.00352	—0.00552	—0.02276	—0.00686	—0.00315	—0.01960	—0.00265	—0.00342	—0.00107	—0.02840
—0.00085	—0.00106	—0.00167	—0.00687	—0.00207	—0.00095	—0.00591	—0.00080	—0.00103	—0.00032	—0.00857
—0.00284	—0.00355	—0.00556	—0.02293	—0.00691	—.00317	—0.01975	—0.00267	—0.00344	—0.99108	—0.02861
—0.00204	—0.00256	—0.00401	—0.01653	—0.00498	—.00229	—0.01424	—0.00193	—0.00248	—.00078	—0.02062
—0.00270	—0.00339	—0.0530	—0.02157	—.00659	—.00302	—0.01883	—0.00255	—0.00328	—0.00103	—0.02729
—0.00317	—0.00397	—0.00621	—0.02562	—.00773	—0.0354	—0.02206	—0.00299	—0.00385	—0.00121	—0.03197
—0.00308	—0.00385	—0.00604	—0.02490	—.00751	—.00344	—0.02144	—0.00290	—0.00374	—0.00118	—0.03107
—0.19650	—0.00163	—0.00255	—0.01051	—0.00317	—.00145	—.00906	—0.00012	—0.00158	—0.00050	—0.01311
—0.00341	—0.51587	—0.00668	—0.02753	—.00831	—.00381	—0.02373	—0.00321	—0.00413	—0.00130	—0.03437
—0.00286	—0.00358	—0.43497	—0.02312	—.00697	—.00320	—0.01991	—0.00270	—0.00347	—0.00109	—0.02885
—0.00106	—0.00133	—0.00208	—0.16755	—.00255	—.00118	—0.00737	—0.00010	—0.00129	—0.00040	—0.01068
—0.00184	—0.00230	—0.00361	—0.01488	—.28076	—.00206	—0.01281	—0.00173	—0.00223	—0.00070	—0.01856
—0.00181	—0.00227	—0.00356	—0.01466	—.00442	—.27435	—0.00263	—0.00171	—0.00220	—0.00069	—0.01830
—0.00378	—0.00473	—0.00742	—0.03056	—.00922	—.00423	—0.59522	—2.00356	—0.00459	—0.00144	—0.03815
—0.00327	—0.00409	—0.00641	—0.22642	—.00797	—.00365	—.002276	—0.49383	—0.00392	—0.00125	—0.03297
—0.00322	—0.00403	—0.00632	—0.02606	—.00786	—.00360	—0.02245	—0.00304	—0.48798	—0.00123	—0.03252
—0.00296	—0.00370	—0.00580	—0.03390	—.00721	—.00331	—0.02059	—0.00279	—0.00359	—0.44505	—0.02982
—0.00320	—0.00400	—0.00627	—0.02585	—.00780	—.00358	—0.02227	—0.00301	—0.00388	—0.00122	—0.51238
—0.00257	—0.00322	—0.00504	—0.02079	—.00627	—.00287	—0.01790	—0.00242	—0.00312	—0 00098	—0.02594
—0.00503	—0.00630	—0.00987	—0.04069	—0.1227	—.00563	—0.03504	—0.00474	—0.00611	—0,00192	—0.05077
—0.00187	—0.00235	—0.00368	—0.01515	—0.00457	—.00210	—0.01305	—0.00177	—0.00227	—0.00072	—0.01891
—0.00158	—0.00197	—0.00309	—0.01274	—0.0084	—.00176	—0.01097	—0.00148	—0 00191	—0.00060	—0.01589
—0.00197	—0.00247	—0.00387	—0.01596	—.00481	—.00221	—0.01374	—0.00186	—0.00240	—0.00075	—0.01991

(*Contd.*)

TABLE III (*Concld*)

Footwear	Non-durable	Rent	Fuels & Light	Furniture and Utensils
21	22	23	24	25
—0.00010	—0.00024	—0.03043	—0.04956	—0.00984
—0.00123	—0.00029	—0.03757	—0.06118	—0.00351
—0.00132	—0.00031	—0.04035	—0.06571	—0.00377
—0.00040	—0.00009	—0.01217	—0.01982	—0.00114
—0.00133	—0.00031	—0.04065	—0.06620	—0.00380
—0.00096	— .00023	—0.02931	—0.04772	—0.00274
—0.00127	— .00030	—0.03877	—0.06314	—0.00362
—0.00149	—0.00035	—0.04542	—0.07397	—0.00424
—0.00145	—0 00034	—0.04415	—0.07189	—0.00412
—0.00061	—0.00014	—0.01864	—0.03035	—0.00174
—0.00160	—0.00038	—0.04884	—0.07953	—0.00456
—0.00134	—0.00032	—0.04099	—0.06675	—0.00383
—0.00050	—0.00012	—0.01518	—0.02472	—0.00142
—0.00086	—0.00020	—0.02637	—0.04295	—0.00256
—0.00085	—0.00020	—0.02600	—0.04234	—0.00243
—0.00178	—0.00042	—0.05421	—0.08828	—0 00507
—0.00153	—0.00036	—0.40685	—0.07629	—0.00438
—0.00151	—0.00036	—0.04621	—0.07525	—0.00432
—0.00139	—0.00033	—0.04238	—0.06901	—0.30096
—0.00150	—0.00035	—0.04584	—0.07464	—0.00428
—0.38727	—0.00028	—0.03686	—0.06002	—0.00344
—0.00236	—0.75618	—0.07213	—0.11747	—0 00674
—0.00088	—0.00021	—0 30825	—0.04374	—0.00251
—0.00074	—0.00017	—0.02258	—0.27329	—0.00211
—0.00028	—0.00022	—0.02829	—0.04607	—0.29798

VI. CONCLUSION

We have got reasonably good estimates of Engel elasticities in terms of fit of the functional form used and the level of significance of the income co-efficient we are interested in. More importantly all the demand elasticities with respect to price turned out to have correct signs. This is a very encouraging result compared to the previous experience of a much modest nature where only the income and price response of paddy was considered and the sign of the price co-efficient turned out to be wrong (Alamgir and Berlage 1973).

Since $\hat{W}$ plays a key role in Frisch's computertional formulas for the demand elasticities with respect to price, a stable, accurate value of $\hat{W}$ is necessary for the use of Frisch's formulas. Hence, it is useful to have some idea of the sensitivity of the Frisch estimates to the choice of $\hat{W}$. Differentiating equations (2) and (3) with respect to $\hat{W}$, we get :

$$(6) \quad \frac{de_{i1}}{d\hat{w}} = \frac{-E(1-a_i E_i)}{\hat{W}^2}$$

$$(7) \quad \frac{d\, e_{ik}}{d\, \hat{w}} = \frac{E_i E_k a_k}{\hat{W}^2}$$

The rate of change of e_{ik} (all i, k) with respect to $\hat{w}$ is smaller (in absolute value) the larger (absolute) is $\hat{w}$.

To quote Ayanian (1969, p. 90) "the rate of departure of an estimated e_{ik} (all i, k) from the true e_{ik} is quite small if the actual $\hat{w}$ is nearer -2. At values of less than -2 (in absolute value) the "sensitivity" of the e_{ik} to $\hat{w}$ increases extremely rapidly ; at $|\hat{W}| > 2$ the "sensitivity of the estimated e_{ik} to $\hat{w}$ quickly approaches zero. Hence our estimates seem to be quite robust from this point of view.

As for the reliability of our estimate $\hat{w}$, Frisch suggests that $\hat{w}$ decreases in absolute value as real income increases and vice versa. For developed countries $\hat{w}$ in general is found to be around -2. Therefore, it is quite reasonable that $|\hat{W}|$ for Bangladesh should be larger than 2 as it is one of the poorest countries in the world. Hence our estimates of demand elasticities turn out not only reasonable but also quite reliable and robust.

Finally we must emphasize the need for generating reliable price data on a continuous basis so that more direct and sophisticated methodology may be employed to estimate the demand elasticities which are very useful for demand projections, macro-models, and economic planning in general.

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Appendix

TABLE 1

Per Capita Expenditures on Food Items by Income Groups

Monthly Household Income Groups	Per Capita Consumption Expenditure	Cereals	Pulses	Milk	Milk Product	Edible Oil	Mutton	Beaf	Fish	Chicken	Eggs
1	2	3	4	5	6	7	8	9	10	11	12
1	15 06666	6.56862	0.34902	0.00000	0.00000	0.87058	0.00000	0.00000	0.25098	0.00000	0.0000
2	29.65233	13.82795	0.73835	0.26523	0 00000	1.05376	0.00000	0.01075	0.96415	0.02867	0.0573
3	37.71810	17.81305	0.87240	0.11869	0.00296	1.36795	0.01186	0.03560	1.83976	0.02077	0.0771
4	45.48704	22.66062	1.10621	0.19948	0.00518	1.53886	0.02331	0.04922	2.32383	0.05958	0.0958
5	53.20142	26 58056	1.17061	0.29156	0.01184	1.75118	0.07109	0.09715	3.02369	0.12559	0.0971
6	57.98301	28.77282	1.36093	0.47933	0.01273	1.96603	0.43099	0.15711	3.24416	0.16135	0.1443
7	66 17523	32.39047	1.68000	0.79619	0.02476	2.21904	0.07619	0.23047	3.67428	0.22857	0.1828
8	74.73244	35.44147	1.91806	1.20234	0.04849	3.50334	0.15886	0.38461	4.13712	0.42474	0.2675
9	88.00873	40.77438	2.32751	1.75837	0.08296	3.07132	0.32460	0.49490	4.51819	0.65356	0.3100
10	104.15674	45.95990	2.78250	2.83353	0.21385	3.68529	0.58687	0.81652	5.03766	1.01336	0.3912
11	118.84268	49.59218	3.10120	3.58416	0 47094	4.48697	0.78056	0.83466	5.19038	1.24448	0.5260
12	156.34372	54.91567	5.44038	3.30064	0.60678	5.03483	1.06874	1.13932	9.55453	1.53712	0.5875
13	345.24444	79.80185	11.23148	4.08055	1.33333	26.71388	2.02037	1.18703	12.56203	2.16203	0.7787
All Groups	1192.61254	455.09954	84.07915	18.91047	2.81382	57.26303	5.55344	5.43734	56.32076	7.65982	3.5158

(*Contd.*)

TABLE 1 (*Contd.*)

Potato	Onion	Vegeta-bles	Fruits	Salt	Spices	Sugar	Ciga-rettes	Tea	Cloth-ing	Foot-wear	Non-durable	Rent	Fuel and Light	Furni-ture and Uten-sil
13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0.04313	0.11372	1.41960	0.00000	0.15686	0.50538	0.00000	0.00000	0.00000	0.25098	0.00000	0.00392	1.08627	2.61176	0.1336
0.07168	0.28673	1.55914	0.11469	0.24014	0.84946	0.01792	0.00358	0.00358	1.21863	0.00716	0.00358	2.13520	4.53405	0.15053
0.13649	0.43520	1.79822	0.17210	0.24925	1.02670	0.01483	0.04747	0.01186	1.76557	0.00890	0.01483	2.51038	4.70029	0.20474
0.16839	0.45077	1.72020	0.29015	0.26165	1.13730	0.02331	0.10103	0.03626	2.03886	0.02072	0.01813	2.74611	5.07513	0.22279
0.28673	0.51184	1.83175	0.28436	0.26303	1.30805	0.07346	0.17061	0.02369	2.38388	0.03554	0.02606	3.07582	5.69431	0.24644
0.33545	0.52441	1.85350	0.39278	0.26539	1.44798	0.10615	0.22293	0.02335	2.63906	0.05307	0.03397	3.34607	5.68789	0.28450
0.41523	0.57904	1.84761	0.53333	0.28381	1.60571	0.15309	0.27238	0.05333	3.21714	0.07047	0.04952	3.68952	6.08571	0.33714
0.47658	0.65050	2.04013	0.59866	0.28428	1.73745	0.22408	0.40969	0.07023	3.92307	0.12709	0.06521	4.18561	6.45150	0.41471
0.63464	0.73071	2.13537	0.88791	0.30229	2.04221	0.41193	0.58952	0.10480	4.64483	0.16011	0.10043	4.81950	6.82532	0.48034
0.93560	0.73876	2.36816	1.14094	0.33414	2.23572	0.70359	0.77642	0.17010	5.98293	0.24908	0.13730	5.45079	7.20534	0.55528
1.07214	0.72768	2.42284	1.49499	0.29258	2.31663	1.03116	1.19539	0.26353	7.12625	0.46092	0.22945	6.44990	7.51202	0.56813
0.98900	1.64619	5.09524	1.22364	1.47937	10.63061	1.11090	1.33180	0.39505	8.51329	0.52154	0.24931	8.45187	7.56187	0.70210
1.29166	5.07129	4.08333	1.86481	1.36203	66.79444	2.45000	1.98888	2.22870	12.20833	0.81481	0.68148	8.65555	25.07129	1.18200
6.85671	12.46784	30.17609	8.99836	5.77482	93.63814	6.38142	7.10962	3.38948	55.91287	2.52941	1.61319	56.60359	95.01648	5.49246

Book Reviews

Profiles of Female Poverty by Leela Gulati

Women's participation in economic development is often misconceived as the scope to participate equally with man in paid employment. That such a myth is mistaken is amply illustrated by the book under review. Paid employment, with everything else including the socio-economic structure remaining the same can only reinforce existing poverty and injustices.

The author described the cases of five working women, their family life, working conditions, aspirations and in fact most aspects of life and death.

The book is organised in seven chapters. The first chapter introduce the major characters of the case studies and the method of selecting and interviewing. The next five chapters contain the case studies. In the last (seventh) chapter some general observations are presented.

The case studies include one agricultural labour, two industrial workers (one in coir industry, the other engaged in brick making) one fish vender and the last one is of a construction worker. All of them are married, living with husband and children. The ages vary between 35 and 45 years. So at the very beginning it seems that two aspects of poverty and distress for women may be missing from these case studies. One is associated with old age and the other is related to widowhood or divorce. Of course within a single book, everything cannot be covered, but one or two cases with these characteristics could help our understanding of these problems and add a variety to the descriptions.

Since the methodology is presented first we start with a comment on this. Selection of the person who seemed to be most cooperative and friendly might have made it convenient to study the case but at the same time may introduce a bias. Of course, in case studies a random representation is not aimed at. But the friendly nature of the respondent may have led to over-emphasis on their sorrows and distresses.

The case studies are presented in more or less a similar format. It would be convenient and time saving to follow each case if this format was briefly discussed in the introduction. In the absence of this, the reader may feel lost in the detailed descriptions of huts and food, work and wages, husband and children.

Now we try to sort out this format and we shall find that the details contain useful and penetrating information. The huts and houses are described first and this gives an idea about the extent of poverty. Information about parents, marriage and husband give a background which can be compared with the present position and provide some ideas about how she becomes poorer. Almost each case study contains details of how each child grew up, their aspirations and the special problems as they grew up. The role of children in our present social context is important in determing parents position and the detailed examination of each shows how they relate to the situation of present poverty. The important incidents of each woman's life is discussed, though this discussion could perhaps have been more systematic. They may involve setting of new huts, son's employment, death of a goat, mortgaging ration cards, illness etc. Experience in family planning shows its failure to achieve its aim. The most important aspect in each case study are the details of employment. Description of the type of work, wage rates and sex discrimination, future prospect etc. give a very useful picture of how women's employment is not paying for the pains undertaken by them. Description of their food intake, disposition of wages tell us that such employment does not give them any special status or advantage within the family. This format helps to bring out useful information of different types which can hold the interest of readers of different disciplines.

The shortcomings of her format may not be very apparent as the reader is attracted by the storylike incidents and narratives. To us the problem lies there.

Some of the descriptions are too lengthy as compared to their contribution towards the understanding of the problem of poverty and injustices. The details of huts, marriages, the bringing up of children, problems with each of them, could have been shortened. On the other hand some important information on the operation of the socio-economic structure goes unnoticed under different headings. For example, in the fish vendor's story, the activities of the large boat owners shows how the factor markets in the rural areas operate in an interlinked way. These owners supply loans at zero or low interest rates to ensure the availability of labour at wages below the market rate even in the peak season when labour is scarce.

We think that it is the result of a more general and important shortcoming in this whole effort. This is the lack of analysis of the causes of poverty and how such poverty is perpetuated. Such analysis can be deduced from the descriptions and could be supplemented by the comments of the interviewees

on what they think about such causality. The author could incorporate her own analysis in the chapter on general observations. Instead of doing that in this chapter she is mostly concerned with some generalised comments on the nature of sex discrimination of employment and wage and the prospects of such employment. We do not want to comment on whether such generalisation is proper or not but a more useful way of looking at the cases would be to comment on the causes and processes which create poverty. One example may be the vulnerability of these women to major and minor accidents and unfortunate incidents. From the cases we can easily conclude that these incidents operate to perpetuate poverty. For example the agricultural labourer Kalyani was living in a situation of poverty. The situation becomes worse after the illness of her husband and the expenses required for his recovery. This led to the pledging of ration cards and thus deprivation from subsidised food. The collapse of the roof of the hut added to the misery as it required more borrowing, perpetuating her indebtedness and leaving no hope for any improvement. Similar distress is caused by Josi's (fish vendor's husband) disablement subsequent to the vasectomy operation or a crop failure for kesari's (coir worker) husband and small incidents like the death of kanan's (the brick worker's husband) goat. In most cases the loan suppliers take the advantage and the perpetuation of indebtedness is a chain in this whole process. For these women, working hard is no solution to such vulnerability unless some institutional support is provided at least after the accidents. This needs a whole package of changes in the socio-economic structure. Since the author does not suggest the causes of poverty, the policy measures are also not dealt with. A more complete treatment of the problem should have included this or at least what the respondents expected from the policy markers to improve their lot.

It is true that we cannot arrive at general conclusions from such case studies. But they can help to further our knowledge in the following ways.

a) More extensive information were collected. This may form the basis for formulating statistically testable hypothesis on the basis of which large scale data collection may be possible.

b) The information collected is based on intensive effort and ensures listing of finer details which in turn makes the information more reliable through cross checking.

Inspite of the theoretical shortcomings, the book does give a vivid and indepth look at the experience of poverty if not its causality.

Bangladesh Institute of Development Studies
Dhaka **Rushidan Islam Rahman**

The Use of Time and Underemployment in Rural Bangladesh : by Dr. Barkat-e-khuda (Published by the University of Dhaka, May 1962. pp. 205 + xv. Price : Tk. 100.00 or US $ 10.00).

This book of Dr. Khuda is a modified and updated version of his unpublished Ph. D. thesis done earlier (A. N. U. Canberra, 1978). His contribution in this book undoubtedly is of great value. The data for this study are from a survey conducted in a village of Comilla District during 1975/76. The book is divided into 7 chapters with sixty-four tables. In addition there are two appendices on methodology of data collection and categories of the use of time.

The first chapter deals with the various concepts and approaches adopted in the measurement of labour force in rural agrarian societies with special reference to Bangladesh and presents an alternative approach to the measurement of the economically active population. Chapter two is a critical review of the literature on the subject and of the methods of measuring surplus labour. This has been done keeping in mind the need for empirical investigations to complement and test the theoretical discussion.

In the next chapter it has been shown how and to what extent the nature and pattern of labour utilisation in a society is influenced and affected by a variety of socio-economic and demographic factors. The intensity and duration of work and work opportunities themselves depend on such factors as size of cultivable land holding, land tenure arrangements, cropping pattern and practices, economic organisation, livestock, etc. Social factors have been identified as family type, observance of purdah (seclusion of women from menfolk), etc. Besides these, participation in labour force activity is also influenced by such variables as age, sex and other demographic attributes of the population.

Then the author gives an analysis of labour force participation, dependency ratios, structure of the labour force and some of the characteristics of the 'non-working' population in the study area.

Chapter 5 demonstrates how people allocate their time among various activities. Time is the main household resource among the poorer households. The use of time is relevant not only in the production of goods but

also in respect of various services which are indispensable to the maintenance of household. The study of the use of time by individuals is relevant to the interest not only of development economists but of other social scientists as well.

Chapter 6 discusses critically some of the past findings on the extent of surplus labour in Bangladesh and presents estimates of unemployment and underemployment from the study area.

The concluding chapter (7) summarises the findings. Unless people in rural areas have an adequate intake of calories, they cannot work to their full physical capacity. Clearly, this represents a loss in respect of utilization of human resources. In the case of males the potential supply of labour is influenced more by demographic factors such as the size and age distribution of the total population than social and economic factors. However in the case of females and of younger and older males it is believed that socio-economic and cultural factors seem to influence the labour force participation rates significantly.

The difference in the number of hours worked between those reported as 'working' (and hence, in the labour force) and those reported as "dependents" is not as sharp as to permit such a distinction. Such a functional distribution, meaningful as it is in the context of the developed countries, is not quite relevant in rural agrarian societies, where it, in fact, leads to misleading conclusions on the extent of the dependency burden. The number of hours spent on directly productive activities is functionally related to age and sex. Any research on work input, particularly that of women and children, which overlooks or ignores time spent on household maintenance activities grossly underestimates their contribution to the household economy.

The study is an attempt to provide a detailed analysis of the pattern of labour utilisation as well as to test the usefulness of the various conventional approaches and definitions generally employed in the measurement of labour force in rural agrarian societies. The study is the first of its kind so far in Bangladesh which examines how people in rural areas allocate time among various activities, based on time budget data collected daily over a period of 210 days. It points out the limitaions of various conventional approaches to the measurement of labour force and its utilization, especially in the case of women and young children. The study also examines the division of labour by age and sex. *The study found that if "work" merely refers to income generating or directly*

productive activities, women worked less than men. However, if household maintenance activities are considered within the purview of 'work', women were found to work longer hours than men.

The present study provides a critical evaluation of some of the earlier studies on underemployment in rural Bangladesh and presents findings from the village under study. It contains a critical review of the various concepts of underemployment and measurement techniques also. Rather than using an eight-hour working day, a concept appropriate in the industrialized societies and in the formal sector of the less developed countries but not meaningful and realistic in the context of rural agrarian societies, the study provides more realistic estimates of potential supply of labour based on age and sex.

Most attempts at the measurement of underemployment in rural Bangladesh have considered the farming male population and time spent on agricultural activities only and therefore, provide a partial picture of the rural employment situation. The present study is concerned with the farming and the non-farming population of both the sexes and time spent on all income generating or directly productive activities as well as time spent on household maintenance activities.

Information on employment using the census approach and the usual types of snap-shot labour utilization surveys is based on the concept of "looking for work". Such a concept though appropriate and relevant in the context of developed societies, does not make much sense in rural agrarian societies and hence unemployment figures based on such a concept are too low to represent reality. The present study gives more reliable and meaningful unemployment figures, based on more realistic concepts.

Studies on the use of time are few in rural agrarian societies and fewer, indeed, so far as rural Bangladesh is concerned, particularly with respect to women and children. Women constitute roughly half the total population of the country, but unfortunately not much is known of their use of time. Ignoring them or according them only little importance, would mean that we know nothing or far too little about such a vast segment of the population. The present study examines how men, women and children make use of their time divided among directly productive activities, household maintenance activities and other non-work uses of time. Such a study facilitates an evaluation of the importance of male, female and child labour in directly productive activities *vis-a-vis* home management.

The extent of utilisation of human resources may be revealed from the estimates of unemployment and underemployment of various sectors. In other words unemployment and underemployment measures the extent of labour underutilisation, it gives an indication of the potential output lost. Since employment is a means of earning for a lot of people, the degree of labour underutilisation measures the degree to which the society has failed to provide opportunities to many to earn through work. The present study investigates the extent of seasonal fluctuations in employment in rural Bangladesh. Unfortunately, not much is known of the seasonal component of underemployment in rural Bangladesh.

The author has demonstrated the importance of the substantial work input by children. This provides a clue to understanding the conditions of prevailing high fertility in our society. The work also suggests that at the current rate of production and underconsumption, children probably have a net positive economic value to their parents in rural society, aside from the old age security they provide them. Dr. Khuda really provided fresh insights and important guidelines into the importance of rural labour force utilisation, specially of the child and female labour force.

Bangladesh Institute of
Development Studies
Dhaka.

Serajul Islam Laskar

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Measuring Social Welfare : Theory and Practice

by

OMAR HAIDER CHOWDHURY*

This paper proposes a new index of welfare reflecting poverty that takes into account the welfare of the poor and the non-poor in the society. Sen's analytical frame-work for real income comparisons is modified to widen the scope of welfare interpretation of different measures. Information requirement of the measure is very limited.

I. INTRODUCTION

The traditional concept of aggregate income alone indicating the level of welfare of a society is no longer accepted unquestioningly ; how this income is distributed among the members of the society is also regarded as an important factor in measuring its level of welfare. Recently the focus of attention of the less developed countries (LDC's) has shifted from inequality to poverty. Mass poverty in some of these countries have forced their governments to accept elimination of poverty as the primary objective of development planning. It is argued that the over-all income and its distribution may improve leaving the income of the poor and/or their distribution of income unaltered or even worsened. Hence, as far as these countries are concerned, an index of welfare constructed only in terms of aggregate income and its distribution[1] cannot reflect their preference orderings among alternative economic states. Therefore, poverty must be included in any measure of welfare for such poor countries. Poverty can again be the sole determinant[2] or one of the factors determining it. In the former case, we call the measure a welfare index of absolute poverty, welfare of the non-poor in the society are completely ignored. But it is argued that povery is essentially a relative notion, and the sense of deprivation felt by the poor man when he compares his income with that of others in the community as a whole, not only, with those of the individuals below

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1See Sen (Sen 1976a).

2See Sen (Sen 1976b) and Osmani (Osmani 1982).

the poverty line, is a very real and important aspect of poverty. Hence, any index of welfare reflecting poverty in the society must incorporate this sense of relative deprivation along with the notion of absolute poverty discussed above.[3] It is thus clear that one can think of at least three different measures of welfare depending upon the preference orderings of the evaluator. Our measure of welfare is derived from the relativist view of poverty, called the welfare index of relative poverty. We shall see later that the other two measures of welfare discussed above can very easily be derived similarly by simply modifying our measure only slightly.

II. A BRIEF REVIEW OF POVERTY INDICES

Let us begin by considering Sen's (Sen 1976b) index of poverty. He considers a community S of n people, where the members are numbered in ascending order of income, i.e.,

$$(1) \quad y_1 \leq y_2 \leq \cdots \leq y_q \leq y_{q+1} \cdots \leq y_n$$

The set of people with income no higher than x is called S (x). If the poverty line z is exogeneously given and is equal to y_q, then $S(y_q)$ is the set of the poor. $S(y_n)$ is obviously the set of all people in the community S.

The poverty gap g_i of any individual is defined to be the difference between the poverty line z and his income y_i :

$$(2) \quad g_i = z - y_i$$

Now the earliest and the most widely used index of poverty involved counting the number of poor. When expressed as a percentage of people below the poverty line, this measure is known as the "headcount ratio" and is expressed as :

$$(3) \quad H = q/n.$$

The other widely used measure called the "poverty gap" is the aggregate short-fall of income of all the poor taken together from the poverty line. Sen normalised this poverty gap into per-person percentage gap I, which he called the "poverty-gap ratio". :

$$(4) \quad I = \sum_{i \in S(y_q)} g_i / (qz)$$

[3]See Takayama (Takayama 1979).

Sen criticises both these measures H and I on the grounds that they are insensetive to each other and that both of them are insensetive to income distribution of income among the poor. He therefore proposes the following measure :

$$(5)\quad P_s = A \sum_{i \varepsilon S(y_q)} v_i g_i,$$

Where A is a normalising constant and v_i are non-negative distributional weights. The following axioms were introduced by him to derive a precise formula from the above eqn. (5).

AXIOM M (Monotonic Welfare) : The relation $>$(greater than) defined on the set of individual welfare numbers $\{W_i(y)\}$ for any income configuration y is a strict complete ordering, and the relation $>$ defined on the corresponding set of individual incomes $\{y_i\}$ is a sub-relation of the former, i.e., for any i, j : if $y_i > y$, then $W_i(y) > W_j(y)$.

AXIOM R (Ordinal Rank Weights) : The weight v_i on the poverty gap of person i equals the rank order of i in the interpersonal welfare ordering of the poor, i.e., $v_i = q + 1\text{-}i$.

AXIOM N (Normalized Poverty Value) : If all the poor have the same income, then $P_s = HI$.
Sen derived the following index of poverty which satisfied the axioms M,R, and N when the number of poor q is large :

$$(6)\quad P_s = H[I + (1\text{-}I)G^P].$$

where G^P is the Gini coefficient of the income distribution among the poor.

Sen further asserted that replacing the poor q by the entire population n and replacing the poverty threshold of income z by the mean income $\bar{Y}$ would transform P_s into the Gini coefficient of income inequality G.

Noriyuki Takayama (Takayama 1979) points out two problems in this procedure. First, Axiom R is arbitrary in the sense that the ranking is based on the truncated distribution, or the "poverty distribution" and neglects the existence of people above the poverty line. Hence this measure does not capture the essential relativist concept of poverty present in comparing a poor man's income *vis-a-vis* the income of all other members of the society, not only with the incomes of the individuals below the poverty line.

Second, Axiom N is also arbitrary in the sense that it cannot give a full axiomatization of the Gini measure of inequality in combination with Axioms M and R only. He shows that another normalized value is needed to specify A in eqn. (5) to complete axiomatization of the Gini coefficient as a measure of inequality.

Takayama provides the full axioms which underlie the Gini measure of inequality before proposing his index of poverty. The income gap p_i of any individual i is defined by him as the difference between the mean income $\bar{Y}$ and his income y_i :

$$(7)\quad P_i=\bar{Y}-y_i, \text{ where, } \bar{Y}=\sum_{i\varepsilon S(y_n)} y_i/n.$$

The index of income inequality E of a given income configuration (1) is defined to be a normalized weighted sum of the income gaps p_i of the whole community :

$$(8)\quad E=B\sum_{i\varepsilon S(y_n)} w_i p_i + C$$

where, B,C, and w_i are constant terms for a normalization, and non-negative weights, respectively. Thus, the index of inequality E of a community is given by the value of the weighted "aggregate income gap" of the total population. The following axioms are then proposed to transform the absolute poverty index into a relative one of inequality.

AXIOM R* : The weight w_i on the income gap of person i equals the rank order of i in the interpersonal welfare ordering of the whole population, i.e.,

$$w_i=n+1-i.$$

AXIOM N* : If all the people in the community have the same income, then E=O.

AXIOM N_1 : If the richest monopolizes the whole income and all the others have zero income, then $E=1-1/n$.

He then shows that the only index of income inequality satisfying Axioms M, R*, N*, and N_1 is given by the Gini coefficient of the income distribution of the total population :

$$(9)\quad E=G.$$

Finally, Takayama introduces the concept of censored distribution before defining his index of poverty. The censored income vector $y^*(z)$ truncated from above by the poverty line z is :

$$(10) \quad y^*(z)=(y_1^*, y^*_2, \ldots, y^*_q, y^*_{q+1}, \ldots, y^*_n),$$

where, $y^*_i=y_i$ if $y_i<z$, and $y_i^*=z$ if $y_i \geq z$.

y_i^* is set equal to z if y_i is equal to or is greater than the poverty level z in order to retain continuity. Censored income distribution defined thus enables Takayama to use inequality indices for measuring poverty as well. His index of poverty P_t is given by :

$$(11) \quad P_t=D\sum_{i \; S(y_n^*)} w_i(\overline{Y^*}-y_i^*)+T$$

where D and T are normalising constants, w_i is the distributional weight and $\overline{Y^*}$ is the mean income of the censored income distribution defined as :

$$\overline{Y^*}=(1/n)\sum_{i \; S(y_n^*)} y_i^*.$$

Takayama then proposes the following axioms to specify the general form of the eqn. (11).

AXIOM N_2 : If no persons are below the poverty line, then the poverty index equals zero.

AXIOM R_1 : The weight w_i on the poverty gap of a person i equals the rank order of i in the interpersonal welfare ordering of the whole population, i.e., $w_i=n+1-i$.

AXIOM N_1 : If all the poor have no income, then the index of poverty is equal to the head-count ratio ; i.e., if $y_i^*=O$ for $i \varepsilon S(y_q^*)$, then $P_t=H$.

Takayama finally proves that the only index of poverty satisfying Axioms M, R_1, N_1, and N_2 is given by the Gini coefficient of the censored income distribution truncated from above by the poverty line :

$$(12) \quad P_t=G^*.$$

where G* is the Gini coefficient of the censored income distribution.

Thus, the Gini coefficient has been proved to be not only a measure of inequality, but also an index of poverty. But as Takayama points out G* does not always "satisfy the monotonicity axiom" as a reduction in the income of someone below the poverty line can reduce (rather than increase) the degree of poverty. Hence P_t may not always capture the notion of absolute suffering reflected in P_s. Axioms N_1 and R_1 can also be argued to be arbitrary though less than R and N in Sen's procedure. But given the axioms, the welfare implications of both these indices when the total income and/or the size of the population of a community changes are not clear. As it is obvious from axiom M, the indices are relevant only for a given total of income and a given size of population. Hence, for all practical purposes these indices are not geared to tackle the real world problem of comparing intertemporal or intercountry poverty where both the total income[4] and the sizes of population are expected to vary.

III. A NEW FRAMEWORK

Sen (Sen 1976a) recently proposed a framework of real income comparison where a commodity going to different individuals are treated as different goods, called 'named goods',[5] and social preference orderings are defined on the space of bundles of such named goods. Within this framework it was possible not only to integrate efficiency as well as equity cosiderations into a measure of welfare, but also to tackle the problem of price variations in a systematic way. Sen considered a community of n persons $i = 1, 2, \ldots, n$ with m commodities $j = 1, 2, \ldots, m$. Commodity j going to person i is called a named good ij, the amount of which is denoted by y_{ij}. There are, obviously, mn named goods, represented by the vector y. The amount of each commodity consumed by person i is given by the 'personal basket' $i(\underline{y})$. Clearly, $\underline{y}$ is an mn-vector, while $i(\underline{y})$ is an m-vector, and the n 'personal baskets' together give the same information as $\underline{y}$.

Instead of a real valued welfare function $W(\underline{y})$, only a social ordering over the alternative named goods vectors is assumed. Let R stand for the weak relation of social preference ('at least as good as') with P and I standing respectively for its symmetric and asymmetric parts. The set of named goods vectors in the non-

[4]As pointed out by Mr. A.A. Abdullah, G* has one very odd implication when total income is allowed to change. If all the non-poor become richer, G* is unchanged, which hardly squares with the "relativistic" notion of poverty.

[5]Hahn (Hahn 1971) introduced the term 'named goods' in a different context while Fisher (Fisher 1956) first explored the idea of making social welfare judgements on the basis of interpersonal distribution of physical commodities.

negative orthant (Y) of the mn-dimensional real space that are at least as good as y according to R is called R(y), i.e.,

$$R(y) = \{ x \in Y \mid xRy \}.$$

The following axioms are then proposed to indicate the relationship between changes in aggregate income and social welfare

AXIOM C : R completely orders Y.

AXIOM V : For each y in Y, R(y) is convex.

AXIOM M* : For any y, x in Y ; if $y \geq x$, then yPx.

Axiom C requires that R be transitive and complete over Y. Axiom V is a condition of quasi-concave welfare. In individual welfare functions, this axiom follows convex individual preference coupled with a social preference reflecting egalitarianism. Axiom M* makes social preference respect vector dominance, and is in fact a condition of social non-satiation. In the individualistic social welfare functions respecting the Pareto principle, it follows from the non-satiation of the individuals in the absence of externalities.

Sen finally proposes the following basic theorem of 'constant weight real income' as a guide to social preference.

(T.1) Axioms C,V, and M* together imply that for any y in Y there exists a weight vector s such that for all x in Y : if $s\,y > s\,y$, then yPx.

Proof. By axiom M*, y is not interior to R(y), and since R(y) is convex, it follows from a well-known theorem of Minkowski that there is a hyperplane H through y bounding R(y). If the normal of the hyperplane H is s, then for all z in R(y) : $s\,z \geq s\,y$. Hence if for some x : $s\,y > s\,x$, then x is not in R(y).

By axiom C, yPx.

In a two dimensional case, a hyperplane H(y) is simply a tangent at the point y to the welfare contour through y. The vector s is simply the slope of this tangent. It therefore, represents the social marginal rates of indifferent substitution among the named goods at the point y. Thus the normal s is a vector of shadow prices, and $s\,y$ is the aggregate income measured in shadow prices. The above theorem shows that if the aggregate value of the named goods evaluated at the constant shadow

prices relevant for y is higher for y than for x, then y is socially preferred to x. But there are severe limitations on the scope of welfare comparisons based on this theorem alone. Firstly, both y and x belong to the same mn-dimensional real space, and the theorem is valid only for equi-numbered communities. Secondly, the theorem is again applicable for a given R. Suppose y and x are named goods vectors of communities A and B respectively. Now ypx means only that in the social indifference map generated by it, y lies on a higher curve than x. One cannot then unambiguously conclude that the community A is better off than B when they represent the same community at different points in time or different communities at the same point in time. This is because society's attitude towards material well-being may change over time or tastes, values etc. of different communities may vary. Hence, the same named goods vector may yield different levels of welfare to the same community at different points in time or to different communities at the same point in time. Therefore, the relation ypx can only be interpreted to mean that y is preferable to x from the point of view of a particular community only ; and as the point of view changes, so may the ranking between the two named goods vectors.

Recall again that s is a vector of shadow prices, which in turn is a product of two factors, namely, (i) individual's marginal rates of substitution between different commodities indicating weights of different commodities going to the same person, and (ii) the distributional weights attached to the levels of individual incomes or the weight of the same commodity going to different persons. Now market prices coincide with intrapersonal commodity weights under the unrealistically restrictive assumptioons that (i) each person's welfare depends only on what he purchases, that (ii) buyers are price takers in a competitive market, and that (iii) each buyer is a rational individual. The use of market prices to indicate individual utility further restricts the scope of welfare interpretation based on theorem (T.1). A community cannot actually reveal its preference in the market unless it consumes the commodities. Therefore, no ranking is obtained from the point of view of the community A when $s\,y \leq s\,x$. A community cannot reveal its own vector inferior to another. Hence in real income comparison one may end up with a situation where y is superior to x from the point of view of B. This is because as noted earlier the points of views of the communities concerned may differ. It is thus clear that the scope of welfare comparisons based on the analytical framework discussed above is too restrictive to be of much interest for empirical analyses.

We shall now try to modify the existing framework discussed above in the light of the welfare measure proposed by us, so that unambiguous conclusions regarding the changes in welfare may be drawn. We want our measure of welfare to reflect poverty. As discussed earlier, poverty in such a measure can enter as the only or one of the determining factors of the level of welfare of a society. Whatever may be the case, the first step in such an exercise involve indentifying the poor. This

in turn require determining a necessary minimum level of consumption (food, clothing, housing, medicare, etc.) known as the poverty line, and the people below this standard of living are defined as the poor. For the LDC's suffering from mass poverty this minimum level of consumption should mean the absolute minimum. It is now conventional to define this absolute minimum according to some 'nutritional norm' below which the mere maintenance of a normal physical health is impaired. Hence, the poor according to this definition may be said to suffer from abject poverty which manifests itself physically in terms of malnutrition and hunger. It is thus clear that there is a direct relationship between poverty described thus and the physical well-being of an individual. An individual or a community can only think of satisfying other material needs after this very basic physiological need is satisfied. We saw earlier how the valuation of various needs satisfied by consuming different commodities for calculating individual welfare and the aggregation of individual welfare to indicate social welfare pose complex theoretical and empirical problems. But the notion of welfare defined in physical terms for LDC's suffering from mass poverty would seem to avoid some of these complexities. We propose here to extend the criterion of identifying the poor according to some nutritional norm into measuring their level of individual welfare by the level of nutrient intake.

Protein-energy malnutrition describes a spectrum of clinical disorders and is the most important public health problem in the LDC's today. It is largely responsible for the high infant mortality, low life expectancy at birth, and chronic suffering from such diseases as cholera, typhus, gastroenteritis, etc. Empirical investigations further suggests that it is the energy deficiency which is the real constraining factor in achieving adequate nutrition in LDC's.[6] Hence, intake of calorie as a measure of energy may be used as a proxy for the standard of health of an individual and as such his level of welfare. Information on the distribution of nutrients among members of a community according to the level of income is not usually available. But income and consumption expenditure on various food items by size groups of income are frequently collected for the LDC's. Calorie value of various food items can then provide information on intake level as well as distribution among the members of the population. Hence we can convert the vector $i(x)$ representing the consumption basket of the ith individual into its calorie equivalent. We have thus reduced the vector of commodities to a scalar number representing the welfare level of the individual. Hence every person is consuming only one good, namely, calorie. This 'named calorie' approach may be considered a special case of a more general 'named good' approach discussed earlier. The assumption that the individual is the best judge of his welfare is substituted by an exogeneously determined objective criterion. There is no doubt that the whole approach smacks of strong paternalism. But in public policy discussions it is nothing new to disregard individual preferences on the grounds that they are irrational, short sighted, etc.

[6]See Sukhtame (Sukhtame 1973), Gopalan (Gopalan 1968), Miller and Pyne (Miller and Pyne 1969), Osmani (Osmani 1982), and Chowdhury (Chowdhury 1980).

Again even in the so-called free societies individuals are not necessarily considered to be the best judge of their welfare when decisions regarding health, education, etc. are concerned. More importantly, information on individual utility is extremely hard to come by, if at all. We have discussed under what unrealistically restrictive assumptions market prices may be used to indicate individual utility. It is clear that our method is no more arbitrary than the alternative at hand. Its intuitive appeal in measuring the welfare of a generally poor country cannot be denied. In the bargain our framework considerably widens the scope of welfare interpretation based on theorem (T.1) as will be clear later.

We now need to introduce distributional considerations into our shadow price calculation of aggregate income. There can be two views regarding optimal distribution, viz., needs and desert (Sen 1973, ch. 4). Inequality can be viewed not only as a measure of dispersion but also as a measure of difference between the actual distribution of income on the one hand and either distribution according to need or some concept of desert on the other hand. Our framework suggests that the distributional considerations enter our calculation from the point of view of relative needs. The practical problem of identifying and determining individual needs are wellknown ; but in our case need is exogeneously and objectively determined in terms of some minimum nutritional requirement. Therefore, more weight should be attached to an individual's extra consumption higher is his short fall from the minimum requirement. It now remains for us to decide on a principle of weighting the different levels of calorie intake to derive the shadow price vector $\bar{s}$ and measure the welfare value of aggregate income.

We have thus recast the analytical framework of real income comparison in a way that can be used to indicate individual welfare by some exogeneously determined objective criterion. This amounts to assuming that individual preferences as well as value judgements of the society regarding individual welfare remain unchanged as long as the criterion itself remains the same. Thus the question of points of views differing between communities or changing for the same community over a period of time do not arise. The problem of a community not being able to reveal itself inferior to any other community from its own point of view does not arise as well. Clearly we can now use theorem (T.1) to draw some unambiguous conclusions regarding intertemporal and interregional changes in aggregate welfare. We argued earlier that both our methodology and the institution of market prices as an alternative towards indicating individual welfare suffer from various short comings. But our methodology may not sound unreasonable when we consider that our notion of individual welfare is directly related with his physical health and that the measure is applicable for generally poor countries suffering from mass poverty manifested by hunger and mal-nutrition.

IV. INDICES OF WELFARE

Welfare Index of Relative Poverty

Our index of welfare is inspired by the relativist view regarding poverty ; hence, the welfare of both the poor and the non-poor in the society enter into our measure, called the welfare index of relative poverty. Other measures of welfare, discussed earlier, reflecting the welfare of the poor only, and that ignoring poverty but considering over-all inequality will also be derived to show that our measure is a generalisation of the views expressed in these measures. The shadow price of aggregate income as given by the theorem (T.1) is our measure of welfare. Sen's analytical framework as modified by us along with the tool of censored distribution of income truncated from above by the poverty line as defined by eqn. (10) enable us to propose the following general formula for our welfare index of relative poverty :

$$(13) \quad W = J \sum_{i \varepsilon S(y^*_n)} y^*_i w_i^* \ (\underline{y}^*) = \underline{s}^* \underline{y}^*$$

where,

y^*_i = income (calorie intake in our case) of the individual i in the censored distribution of income truncated from above by the poverty line z (level of minimum nutritional requirement in our case).

$w^*_i(\underline{y}^*)$ = weight on income i.

$\underline{y}^*$ = n-vector representing censored distribution of income

$\underline{s}^*$ = n-vector of shadow prices.

$J > O$ is a constant.

The welfare index of relative poverty W is the weighted sum of individual incomes of all members in the censored distribution of income, weighted by the non-negative weights w^*_i $(\underline{y}^*)$. It is to be noted that the weights w^*_i are a function of vector $\underline{y}^*$ instead of y^*i alone.

The following axiom is now proposed to specify the general form of the equation (13).

AXIOM R^*_i : The weight w^*_i on income i equals the rank order of i in the interpersonal welfare ordering of the whole population in the censored distribution of income $\underline{y}^*$, i.e., $w^*_i = n+1-i$ By Axiom R^*_1

$$(14) \quad W = \underline{s}^* \underline{y}^* = J \sum_{i \varepsilon S(y^*_n)} (n+1-i) y^*_i .$$

Gini coefficient G* of the Lorenz distribution of censored incomes of total population is given by (see Theil (1967) and Sen (1976b)) :

$$(15) \quad G^* = \frac{1}{2n^2\bar{Y}^*} \sum_{i=1}^{n} \sum_{J=1}^{n} y^*_i - y^*_j.$$

where,

$\bar{y}^*$=mean income of the censored distribution of income.

Since, $[y^*_i - y^*_j] = y^*_i + y^*_j - 2\min(y^*_i, y^*_j)$, clearly,

$$G^* = 1 - 1/(n^2\bar{Y}^*) \sum_{i=1}^{n} \sum_{j=1}^{n} \min(y^*_j, y^*_j)$$

$$(16) \quad = 1 + 1/n - 2/(n^2\bar{Y}^*) \sum_{i=1}^{n} (n+1-i)y^*_i .$$

From (14) and (16), it follows that :

$$(17) \quad W = \underline{s}^*\underline{y}^* = ((Jn^2\bar{Y}^*)/2)) \; ((1/n+1) - G^*)).$$

For large n it reduces to :

$$(18) \quad W = \underline{s}^*\underline{y}^* = K\bar{Y}^*(1-G^*)$$

where, K is any constant, G* is the Gini coefficient of the censored distribution of income, or the index of relative poverty P_c (see eqn. (12), and $\bar{Y}^*$ is the average income of the censored distribution of income. Our measure of welfare thus explicitly indicate the trade-off between aggregate income and its distribution. It can also be seen as a measure of welfare where the aggregate income is weighted by an index of poverty.

We have thus derived a very simple measure of welfare that reflects poverty and takes into account the welfare of both the poor and the non-poor in the society. The measure involves estimating only the Gini coefficient and the average of the distribution of income. But this measure is useful only in the special circumstances

where the communities to be compared are of equal population size. We shall now propose a new axiom that will enable us to use our measure for comparing communities with unequal population sizes.

AXIOM I (Size Independence) : Let us consider a θ —fold replica of the censored distribution of income of a community A and denote it as $r(\underline{y}^*, \theta)$. In this relplicated community there are exactly θ times as many persons with income i as in community A. This axiom states that the vectors $\underline{y}^*$ and $r(\underline{y}^*, \theta)$ are equally preferable.

If the social welfare were not independent of the size of the population then $r(\underline{y}^*, \theta)$ and $\underline{y}^*$ cannot be assumed to yield the same aggregate welfare. But if we are ready to compare the standard of welfare (in the sense of per capita income) then this axiom is quite reasonable. Defining social preference relation R^s as the average level of welfare defined above, we can propose the following theorem :

THEOREM (T.2) : If the social preference relation R^s satisfies the Axioms C, V, M^*,R^*_1, and I then $\bar{Y}^*(1-G(\underline{y}^*)) > \bar{X}^*(1-G(\underline{x}^*))$ implies $W^s(\underline{y}^*) > W^s(\underline{x}^*)$ for $n^a \neq n^b$, where n^a and n^b represent the population sizes of communities A and B respectively. Our measure of welfare can now compare communities with varying population sizes in the sense of comparing their average welfare, called the welfare standard of relative poverty.

Welfare Index of Absolute Poverty : Welfare of the poor is the sole determinant of this measure of social welfare. Only the truncated distribution of income or the distribution of income among the poor, is relevant in this case, as the welfare of the non-poor does not count. It is clear that we shall have to propose a new axiom to specify the distributional weights for this truncated distribution of income, truncated from above by the poverty line :

AXIOM R_2^* : The weight w_i^{**} on income i equals the rank order of i in the interpersonal welfare ordering of the truncated distribution of income, truncated from above by the poverty line, i.e., $w_i^{**} = q + 1 - i$.

Following the procedure of deriving the welfare standard of relative poverty discussed above, we can now define the welfare standard of absolute poverty to be[7] :

$$W^S_A = K\bar{Y}^P((1-G^P)$$

[7]See Osmani (Osmani 1982).

where, K is any constant, G^P is the Gini coefficient of truncated distribution of income truncated from above by the poverty line, or of the distribution of income of the poor, and $\overline{Y^P}$ is the average income of the poor given by :

$$\overline{Y^P} = (1/q)\sum_{i \varepsilon S(Y_q)} y_i.$$

Welfare Standard : Sen's (Sen 1976a) measure of welfare did not include poverty in the society, and was formulated in terms of overall inequality and average income only. The following axiom to specify the distributional weights were used :

AXIOM R^*_3 : The weight w_i***on the income i equals the rank order of i in the interpersonal welfare ordering of the whole population of income $\underline{y}$, i.e.,

$$w_i^{***} = n + 1 - i.$$

Clearly the standard of welfare can be defined as :

$$W^{s*} = K\overline{Y}(1-G)$$

where, K is any constant, G is the Gini coefficient of the original distribution of income, $\underline{y}$, and $\overline{Y}$ is the average income.

V. NUMERICAL ILLUSTRATION

Inequality, malnutrition and hunger is widespread in Bangladesh.[8] Hence our framework can be applied to analyse the changes in welfare in Bangladesh as well as to highlight the contrast—if any—in the conclusions drawn according to alternative measures discussed above.

Surveys on income and consumption expenditures of households by size groups of income for both the rural and urban areas of Bangladesh are available for the years 1963/64, 1966/67, and 1973/74. These surveys also report consumption expenditures on particular commodities or commodity groups which account for nearly 90% of the total expenditures on food and drinks. Income and expenditure surveys arrange households according to size groups of income in an ascending order. Our framework assumes that this ordering among the poor will remain intact when per capita calorie and protein intake of the poor are calculated from the nutrient

[8]See Alamgir (Alamgir 1974), Khan (Khan 1977), Osmani (Osmani 1982) and Chowdhury (Chowdhury 1980).

contents of the various food items consumed. We found that one-to-one relationship between ranking of the households according to size groups of income and per capita calorie and protein intake were true in general for the whole income range, the only exceptions being for the 4th and 5th richest income groups in rural 1963/64 and the 2nd and 3rd poorest income groups of urban 1973/74 where this assumption was violated. Again protein deficiency shows up much lower down the income scale—usually the lowest two or three income groups—compared to calorie deficiency. It lends support to the view expressed by other findings (see section 2) that calorie deficiency is the main constraining factor in achieving adequate nutrition. Considering the low standard of living, as shown by average calorie consumption in the table, it is not surprising that the one-to-one relationship between ranking according to per capita calorie intake and incomes of the households should hold

TABLE I

INTERTEMPORAL AND INTERSECTORAL CHANGES IN WELFARE IN BANGLADESH ACCORDING TO ALTERNATIVE MEASURE

Year	Sector	Per Capita Calorie Intake Per Day(Kcal) $\overline{Y}$	Standard of Welfare $\overline{Y}(1-G)$	Welfare Standard of Relative Poverty $\overline{Y}^*(I-G^*)$	Welfare Standard of Absolute Poverty $\overline{Y}^P(1-G^P)$
(1)	(2)	(3)	(4)	(5)	(6)
1963/64	Rural	1771.70 (4)	1595.19 (2)	1614.25 (3)	1569.82 (1)
1963/64	Urban	1779.36 (3)	1593.54 (3)	1617.68 (2)	1559.17 (3)
1966/67	Rural	1628.92 (6)	1419.36 (6)	1436.03 (6)	1381.19 (5)
1966/67	Urban	1687.08 (5)	1519.79 (5)	1539.96 (4)	1496.85 (4)
1973/74	Rural	1896.39 (2)	1549.37 (4)	1521.15 (5)	1363.13 (6)
1973/74	Urban	1984.48 (1)	1716.46 (1)	1689.90 (1)	1562.71 (2)

Notes : (1) Numbers in the parentheses represent ranking according to the welfare measure.

(2) Col. 3 : $\overline{Y}$ is the average calorie intake in the original distribution $\underline{y}$.

(3) Col. 4 : G is the Gini coefficient of the original calorie consumption distribution $\underline{y}$.

(4) Col. 5: $\overline{Y}^*$ and G^* are the average calorie intake and Gini coefficient of the censored distribution $\underline{y}^*$.

(5) Col. 6 : $\overline{Y}^P$ and G^P are the average calorie intake and Gini coefficient of the distrbution among the poor $\underline{y}^P$.

for the whole income range reflecting level of individual welfare of the non-poors as well. Dietaticians argue that[9] "when not restricted by poverty or other adverse circumstance, most people elect to eat a diet which provides about twice the minimal requirement of nutrients". Minimum calorie requirement per capita per day (poverty line z) for Bangladesh was calculated by us to be 2096 Kcal. Highest per capita calorie intake attained by any income groups within the survey periods turned out to be 3920 Kcal reported by the richest income group of rural 1973/74. This is less than twice the minimum requirement which itself is relatively low compared to the poverty lines estimated for other developing countries. Hence we can apply our framework of calorie consumption as an index of standard of health to be a proxy measure of the level of individual welfare of all the members of a generally poor country like Bangladesh. Thus we have used our framework to estimate all the welfare measures discussed above as reported in the table (For details on data and methodology see Chowdhury 1980, ch. 5).

The general low standard of living is clearly demonstrated by the fact that even the average calorie intake is lower than the minimum requirement as shown by the table. It also shows that while there was little difference between rural and urban per capita calorie intake in 1963/64, the discrepancy widened during the later years in favour of urban consumption. Ranking according to other measures also lend support to the finding that in 1966/67 and 1973/74 urban sectors were better off than the rural sectors, whereas the marginal difference between the sectors in 1963/64 contributed to the change in their rankings according to alternative measures employed. Intertemporal comparison between urban sectors rank urban 1973/74 on top according to all the measures used, whereas 1966/76 is placed at the bottom. Similar comparison between rural sectors places rural 1973/74 on top according to average consumption, in terms of standard of welfare (when overall inequality is also taken into account) or welfare standard of relative poverty (when welfare of the poor as well as the non-poor are also taken into account) its ranking falls below that of rural 1963/64, and finally in terms of standard of absolute poverty (in terms of the welfare of the poor only) it is ranked lowest. In the overall intertemporal and intersectoral comparison of welfare, rural 1973/74 is placed second only to urban 1973/74 according to average consumption. In terms of standard of welfare, it is placed 4th, its ranking slipping below rural and urban 1963/64 as well. When poverty is included in the measure, in terms of welfare standard of relative poverty, its ranking slips further behind that of urban 1966/67, to be placed 5th in the overall rankings. Finally, in terms of the welfare of the poor, or the welfare standard of absolute poverty, it is placed at the bottom, whereas even urban 1973/74 loses its top ranking to rural 1963/64.

The general picture that emerges out of this analysis is that while there was little to choose between the sectors in 1963 64, all the measures indicate that during

[9]See Sir Stanley Davidson *et al.* (1975, pp. 34) .

the later years urban sectors were clearly better off than the rural sectors. The welfare implications of this conclusion for the country as a whole becomes clearer when one considers that more than 90% of the population of Bangladesh live in rural areas. Again when we focus our attention on the welfare of the poor, we see that according to welfare standard of absolute poverty, rural 1963/64 is placed on top—replacing urban 1973/74 from that position for the first time—whereas rural 1973/74 is ranked lowest, replacing rural 1966/67 for the first time from that position. Therefore, two broad generalisations may be made ; that welfare in general declined in the rural areas compared to urban areas, whereas the severity of poverty increased over time. The most sinister element in this grim picture is highlighted by the fact that the process of impoverishment of the poor should continue even when the average per capita calorie intake reached the highest levels for both the rural and urban areas in 1973/74. Contrary to the conventional belief of a process of "trickle down" there seems to be a process of "trickle up" going on in Bangladesh.

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Bangladesh in a World of Generalised Floating

by

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The paper attempts to assess Bangladesh's experience under the new regime of 'generalised floating'. In doing so, it focusses mainly on its potential for being yet another source of instability for the economy. The paper endeavours to establish four things. First, through the computation of instability-indices, it highlights the extent of variability experienced in Taka's bilateral exchange-rates and effective exchange-rate. Second, it appraises the qualitative and quantitative impact of this variability on important micro-economic decisions and macro-economic variables. Third it attempts to decompose instability in Taka's effective exchange rate, into a totally external component and one ascribable to exchange-rate policy of the authorities. It is shown that the latter was successful in reducing average instability inthe period of 1976-81 even if variability of bilateral exchange-rates remained high in absolute terms. Fourth, it speculates on potential policy-options and argues that under present conditions, a Taka-dollar-peg has to be the recommended policy.

I. INTRODUCTION

"One has only to imagine what would happen to business calculations and plans if the numbers of ounces in a pound or of inches in a foot were...variable, and then, to remember that whereas these measures enter only into contracts covering goods sold by weight or length, the monetary unit enters into every single economic contract of any kind whatever, to get an idea of the extent of the damage to economic efficiency...."
(Barbara Wooton, quoted in (Halm, 1946).

It is for this reason that generalised floating[1] of world's major currencies has become an issue of considerable concern to developing countries. This new exchange-rate regime is distinct from the earlier adjustable-peg par-value system of

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1When in 1971 the U.S.A. delinked the dollar from its peg with gold and expected other industrial countries to revalue their currencies *vis-a-vis* the dollar, the latter decided to float. The Smithsonian agreement set up a new structure of pegged exchange rates but it did not last because of speculative shifts of capital away from the dollar to currencies that were potential candidates for revaluation. In a world of integrated capital markets, capital mobility, and differential inflation, defense

(*Contd. on Page 29*)

Bretton Woods, in so far as it involves greater frequency of exchange-rate changes, larger share of external adjustment burden being assigned to the exchange rate (Friedman 1953), and the absence of a publicly-declared target rate of exchange. The frequency of realignments in exchange rates of major currencies, is now a potentially new and significant source of external economic disturbance for developing countries. Arbitrary and unpredictable changes in the values of their own currencies *vis-a-vis* those of their main trading partners pose problems of economic management. Such problems are compounded by certain characteristics of developing economies. Prevalence of rudimentary capital markets, restrictions on capital flows, thin foreign exchange markets, highly specialised production structure (Bird 1979; Black 1976; Crockett & Nisouli 1977) and large information lags make quick and efficient responses difficult, under the best of circumstances. It is thus widely agreed that 'floating' is not an appropriate exchange-rate-policy for most developing countries. Yet, in a world where major currencies are all floating against one another, exchange-rate-fluctuations *per se*, are inevitable. Bangladesh's Taka is thus no exception.

The most troublesome feature of this regime of generalised floating has been the increased turbulence of foreign exchange markets, implying enhanced short-term instability of an erratic kind. Contrary to expectations of earlier theory (Friedman 1953) these fluctuations have borne no relationship to the need for current-account adjustment of industrialised countries. Recent theorising about foreign exchange markets as asset-markets suggest that such volatility is intrinsic and has come to stay. Developing countries will thus have to live with the consequent instability in domestic-currency-values of export-receipts and import-payments, making every effort to reduce instability and/or to minimise, to the extent possible, the adverse effect of such instability. This is because the resulting unpredictability and uncertainty in exchange rates complicate the already difficult task of macro-economic management of a developing economy. To date there have been many cross-section and time-series studies (Bautista & Riedel forth coming ; Black 1976 ; Crockett & Nisouli 1977 ; Heilleiner 1981) of developing countries as a group in respect of this phenomenon, but very few country-case-studies (except Bautista 1977) evaluating individual experiences.

This paper attempts to contribute in that area, by assessing Bangladesh's experience under this new regime of generalised floating. In carrying out such an examination, a sharp but necessary distinction has been drawn between the effects of longer-run realignments of currency values over time and the impact of short-to-

(*Footnote 1 Contd.*)

of a pegged rate proved difficult. Thus exchange rates of major currencies floated and changed in response to market conditions i.e. "floating" was generalised for most major currencies since March 1973.

medium-term fluctuations in currency values resulting from "floating" itself. The focus of this assessment is the latter. In that sense it looks at the implications emanating from generalised floating *per se* (as distinct from mere changes in exchange rates) and their impact on the economy. Effects of longer-run realignments have not been analysed here, not because they are less important, but because they refer to a set of problems that are relatively independent of the issue of floating itself.

In the five sections to follow, the paper examines the magnitude of instability in the Taka's exchange rate, assesses its impact on the economy and evaluates past policies and future options in the context of Bangladesh's actual experience under generalised floating. It is shown that in the absence of a single numeraire for expressing the Taka's excange rate, there are numerous bilateral rates *vis-a-vis* major currencies as also an average of these rates. Irrespective of the rates used, the most important issue of concern in this context is the variability and instability of the Taka's exchange-rates. The average rate becomes relevant for gauging the effect of its instability on macro-economic variables, whereas the behaviour of bilateral exchange rates is crucial in determining its micro-economic impact on decision-making of firms and individuals. After laying down the methodological guidlines in Section II, the extent of instability in the average (i.e., Effective Exchange Rate) and the bilateral exchange-rates are estimated in Section III. It clearly shows that a relatively less unstable average rate (i.e., EER), does not necessarily imply less unstable bilateral exchange-rates. The opposite could also be true. In addition, since the actual instability in the average and bilateral exchange-rates of the Taka is a function of Bangladesh's exchange-rate-policy as also the actual turbulence in international foreign-exchange-markets. Section V seeks to distinguish between them. In so doing, it endeavours to establish the effectiveness of that policy in reducing instability. Section IV attempts to indicate the impact of the instability actually experienced while the final section argues for a shift to pegging the Taka to the dollars[2] in view of the problems of a sterling peg and the obvious irrelevance of stabilising the basket value of the Taka.

II. METHODOLOGICAL GUIDELINES

In order to analyse and study exchange-rate instability it is necessary to set out methodological guidelines. This is necessary, because a range of options exist with respect to the empirics of this exercise. Clear-cut choices have to be made on the time-dimension of that measure, the means of measuring instability and the phenomenon to be measured.

[2]This recommendation was indicated by the author in his paper (Matin 1982) presented to Bangladesh Economic Association's Special Seminar which received some publicity in the press then. The Government switched to pegging Taka to the dollar, soon after.

Choice of Time Dimension

The choice of the underlying time-dimension in estimating instability is important. This choice is influenced largely by the objective of the exercise. Fluctuations can be examined on the basis of daily, weekly, monthly or yearly observations.

For analysing short-term variability use of annual observations would not be ideal, as it could lead to considerable loss of information. At the same time, day-to-day or weekly changes may not be useful. They would be too short a period to influence decisions that affect activities in the real sector. This paper therefore uses monthly observations, not only because of data-availability, but also because the interval is not too short to affect important economic decisions[3] nor so long as to lose information of the short-term. Moreover, results based on monthly changes would be comparable to those in other studies, which have mostly used monthly data.

Since relevant indices would provide summary measures of monthly instability in exchange rates, over specific periods, the choice of periods over which monthly instability will be computed must depend upon the requirements of analysis. For this paper, several sub-periods have been chosen in the light of Bangladesh's experience. Indices are computed :

(i) For pre and post-1973 period ;

(ii) For March 1973—April 1976 and for April 1976—December 1981 within post-1973 period.

The first is predicated on the need to assess the extent of increase in instability on account of "generalised floating", as compared to fixed exchange-rate-regime of pre-1973. Selection of sub-periods after March 1973 are suggested by the necessity of analysing different phases of the country's exchange-rate policy. Choice of the two sub-periods before and after April 1976 marks distinct differences in such policy. In the first sub-period, Bangladesh authorities altered the Taka's pegged value with Pound Sterling very infrequently, allowing the Taka's exchange rate with other currencies to be determined solely by changes in the exchange rate of Pound Sterling *vis-a-vis* other currencies in international markets. Subsequently, a more active and flexible exchange-rate-policy was pursued with the purpose of stabilising

[3]Lags between contract and payment/receipt typically range between two to four months. It is likely therefore that monthly exchange rates woud be the bases for traders' expectations in respect of such transactions.

Taka's bilateral rate with the dollar wherein the pegged value was changed thirty-eight times in sixty-four months.[4]

Instability-Indices

The choice of instability-index is also important as its consistency is essential, if useful comparisons are to be made between sub-periods. The widest array of measures of instability have been used in respect of fluctuations in export earnings. Of these, two particular measures have frequently been used in the analysis of exchange-rate instability. One is the standard deviation of monthly percentage change in exchange rates which has been used in earlier works (Kafka 1978), while the other is the standard error from an exponential regression of monthly observations over time. The first measure is perhaps less appropriate for developing countries like Bangladesh. This is because a definite negative trend over time exists in exchange rate movements whereas this measure is concerned with monthly adjustments on the previous month's rate, regardless of whether either month is anywhere near the medium-to-long-run trend. Since the negative trend in exchange rates has been a part of the domestic economic scene irrespective of the new regime of generalised floating, an index of this type which records instability even if month to month changes are on a trend, is perhaps best avoided.[5] As a negative trend in exchange rates can occur and has occurred independent of floating, the "standard error measure" concerned with month-to-month deviations from trend, recommends itself. It is this index of instability that has been used in this paper.

Choice of the Exchange-Rate to Measure

In a world of generalised floating, a totally fixed exchange rate is not feasible. Even if the Bangladesh Taka is pegged to a single currency, it necessarily floats against non-peg currencies, as also currencies pegged to different units. It is therefore not clear as to what is the exchange-rate of the Taka. The answer would obviously depend on the numeraire chosen to express it.[6] Yet the choice of the num-

[4]Indices for another sub-period (Aug. 79—Dec. 81) were also computed, but the results were not significantly different from that of the period of April 76—Dec. 81. The importance of the time after August 1979 stems from the fact that the authorities claimed to be using an 'index' based on a weighted-basket-of-currencies (i.e., EER) as a basis for altering the pegged value of the Taka. Initially the peg was to be altered if changes in the Taka's EER exceeded 2.5%. Later this margin was reduced to 1%.

[5]This may be a perfectly useful measure, if indices of weekly rates were being computed for short periods of six monhs or so, where trend would be unimportant.

[6]Under fixed par-value system, exchange-rates were expressed in terms of gold, U.S. dollar, or the SDR, all of which could be relevant numeraires, as they had a fixed relationship to other major currencies.

eraire is not self-evident. The Taka's bilateral exchange rates *vis-a-vis* each of the major currencies is not doubt relevant for transactors in each of these currency-markets. Instability in them is indicative of the micro-economic impact via decisions of individuals and firms. It is difficult to choose any particular bilateral rate as numeraire, since each is relevant for that specific currency-market.

It is because of this difficulty of analysing movements in exchange rates of several currencies, that it is necessary to have an index that measures, what is in some sense, the average change of the exchange rate against all other currencies. In this context one has to decide whether instability of individual bilateral rates should first be calculated and then averaged in some way or whether instability of weighted average of bilateral rates (i.e., the concept of Effective Exchange Rate) be used.[7] One opts for the latter if only because the first provides information similar to that evident from instability in bilateral rates.

All indices of effective exchange rates (EER) are constructed as weighted—averages of individual bilateral exchange rate indices :

$$EER = \bar{\Lambda}(r_{it}/r_{io})^{wi}$$

which is the weighted geometric average[8] of bilateral exchange rate indices at time t (r_{it}) relative to base value (r_{io}) using weights of w_i.

Most of the controversy in the literature relating to the appropriate means of constructing EER-index, is with respect to the choice of weights. Such a choice would depend not only upon the desired degree of theoretical sophistication but also on the availability of data and the purpose for which indices are constructed. Indices can be used to evaluate the macro-economic effects of exchange-rate changes on balance of trade and current account, on domestic price level, and/or on a country's competitive position. Stabilising such an index would impart stability to the relevant macro-economic variables. Different types of weights have thus been recommended for different pursposes.

When the EER is used to gauge the impact of currency realignments on a country's competitive position, bilateral export weights (i.e., share of countries in total exports) have been suggested (Lipschitz 1979), on the ground that such com-

[7]Though the notion underlying this concept has been used before, in analysing "multiple exchange rate system", its new use received a stimulus from the breakdown of the Bretton Woods par-value system. These indices are now a recognised means of measuring trends and fluctuations in exchange rates.

[8]Arithmetic averages are commonly used. However, geometric average has the advantage of normalising for differences in absolute levels/values of domestic currency per unit foreign currency.

putation may help to suggest the means of either avoiding "effective" revaluation or promoting effective devaluation, to sustain competitiveness of exports.[9] When the EER is to be an index of the effect of exchange-rate changes on the domestic price level, or relative price of traded goods (tradeables Vs. non-tradeables), the appropriate weights are said to emanate from import-shares (Crockett & Nisouli 1977). Since most developing countries are price-takers for their imports, exchange-rate changes are usually translated into changes in the domestic-currency-prices of imports. However to indicate the average impact of exchange-rate changes on the balance of payments position of a country, the relevant EER would have to use a different set of weights. Since the effect on balance of payments is the net result of the impact of exchange-rate-realignments on both the import bill and export receipts, weights based on trade shares alone would provide a crude and imperfect measure of the weighted average effect. It would fail to capture the total effect, as simple trade-weights do not incorporate price-elasticities. Since demand and supply responses to changes in domestic-currency-prices of traded goods will affect the net impact of exchange-rate changes on balance of payments, theory recommends (Feltenstein *at al.* 1979 ; Flanders & Helpman 1979) that weights be obtained from a multilateral exchange-rate-model (MERM) which reflects the existing trade relationships and the sensitivity of trade-flows to changes in relative prices. The efficacy of such MERM weights for developing countries, has been questioned (Hanohan 1979), largely because of the unavailability of reliable data to solve such a model.[10] Therefore, implicit in the use of weights not derived from multilateral exchange-rate model, is the assumption that changes in bilateral exchange-rates do not affect quantities imported or exported, nor their prices in the countries of origin. Even if weights are based on exports, imports or total trade, it is necessary to choose between use of geographic-composition or currency-composition of relevant international transactions. Arguments against the first are made on the grounds that prices of many primary products are not established bilaterally (Lipschitz 1979). Instead they are set in world markets, and quoted in third-country-currencies.[11] The sources of imports or destination of exports do not therefore, indicate either the country where prices are set, or the currency of invoice in which it is traded. For manufactured goods too, third-country-currencies are often used for exports of developing countries.[12] Several empirical works (Bautista 1977 ; Bautista & Riedel

9Even this has been contested on grounds that exchange-rate changes of competitors is more relevant than those of destination-countries which are markets.

10Such weights are available from the Fund's multilateral exchange rate model (MERM) for industrial countries. IMF publishes these monthly weights only for 14 industrial countries.

11Agricultural exports have prices set in U.S. dollars in New York Commodities' markets, mineral and metal prices set in UK Pounds in London Metal Exchange while oil prices are set in US dollars but in West Asia.

12There is evidence in this respect (Grassman 1973 ; Magee & Rao 1980). However, for OECD countries such goods are invoiced in exporters' currency (Carse & Wood 1979; Magee & Rao 1980).

forthcoming ; Crockett & Nisouli 1977) which have baically used geographic shares as weights have tried to overcome this problem by making some adjustments to these weights. They have ascribed exports or imports of primary products not to currencies of countries of destination or source, but rather to countries in whose currencies they are actually priced. For most developed economies, adjustments of this sort would be sufficient to resolve this problem of computing reliable EER's. They would not be so, for developing countries. In the latter, virtually all exports and imports, in addition to primary products, are invoiced in major international currencies, quite different from currencies of their trading partners. In fact, very little trade between developed and developing country or that among developing countries themselves are priced in the latter's currencies (Magee & Rao 1980). There is usually a clear lack of correspondence between geographic-shares of trade and currency-composition of trade. Thus mere adjustments in weights which are derived basically from direction-of-trade cannot be sufficient, if only because the final effect of changes in exchange-rates depend largely on the currencies of invoice of transactions. The relative importance of each currency, whose rate of exchange with home-country-currency has undergone change, cannot be reflected in weights based on direction-of-trade, when there is no correspondence between currency and country of destination or origin. Yet virtually all empirical work on effective exchange rates have to date used simple geographic shares as weights without establishing such correspondence.[13] This exercise on Bangladesh, uses currency-composition of trade as weights and is thus a departure from past practices.

The rationale for doing so is over-whelming, as is apparent from Table I. It is obvious from the table that weights based on geographic-shares of trade would imply not only different weights but also a different basket of currencies, compared to those resulting from the use of currency of denomination. Geographic-composition-based-weights could easily become redundant, where effects of exchange-rates are being examined. The use of currency-shares as weights for the computation of EER, is expected to impart a greater degree of relevance to the results.

The 'Basket' used for computing EER in this paper consists of four currencies with the following weights : U.S. $ 57%, U.K. £ : 29%, DM 9% and JY 5% i.e., weights derived from the currency composition of trade for 1980/81.[14]

[13]Evidence on currency of invoice for most developing countries clearly suggest the lack of such correspondence to be the rule rather than the exception (Rao & Magee 1980).

[14]These are also the weights used by Bangladesh Bank in computing their basket index.

TABLE I

SHARE OF TRADE BY DIRECTION AND CURRENCY-COMPOSITION (1980—81)

(Percentage)

	Geoghraphic Share			Currency Share		
	Export	Import	Total	Export	Import	Total
U.S.A. ($)	9.8	5.9	6.7	28.9	76.1	57.5
U.K. (£)	5.1	3.7	4.1	50.6	8.5	29.5
W. Germany (DM)	1.7	4.2	3.7	1.8	4.9	3.8
Japan (JY)	4.2	11.8	10.2	0.2	4.2	2.2
Others	79.2	74.4	75.3	8.5	6.3	7.0

Source : (a) For direction of Trade : *Annual Export Receipts and Annual Import Payments* (various issues), Bangladesh Bank.

(b) For currency-composition, Data is from records of Research Department of *Bangladesh Bank.*

III. EXTENT OF INSTABILITY

For purposes of this paper, instability has been defined as the standard error of exponential trend of monthly exchange-rates. This section examines the extent of instability in the Taka's bilateral exchange rates, as also in its average i.e., the Takas' effective exchange rate (EER), in an effort to capture the degree of uncertainty that is implicit in such variability.

The concern with exchange rate instability stems from its impact on the domestic-currency-value of international transactions. Different rates of variability in the Taka's bilateral exchange rates with different currencies imply different levels of instability for traders in those currency-markets. While such differences can be averaged with appropriate weights by calculating the effective exchange-rate, fluctuations in individual bilateral exchange-rates are important in their own right. Each transactor is interested in Taka's bilateral exchange-rate for that foreign currency in which his transactions are denominated. Though variability in this context would be chiefly relevant for the specific contract periods, it could influence longer-term decisions affecting volume of exports, imports, allocation of investment, government-sales and so on.

Table II provides estimates of instability in various bilateral rates for pre-and post-1973 periods,

TABLE II

INSTABILITY OF TAKA'S BILATERAL EXCHANGE RATES (%)

Vis-a-Vis	US$	UK£	DM	JY
Pre-'73	0.48	1.41	2.99	2.04
Post-'73	8.90	4.71	12.20	8.00
Period I	7.70	4.70	11.60	5.70
Period II	3.60	3.90	3.30	4.70

Source : Computed from exchange rates provided in :

(a) *International Financial Statistics* : IMF

(b) *Annual Reports* (various issues) : Bangladesh Bank

Note : This index of instability is the standard error of exponential regression of monthly exchange rates on time divided by mean and multiplied by 100.

It appears that instability has increased several-fold in the post-1973 period as a whole. Instability in exchange rates has obviously been considerably greater under generalised floating than under par-value system. The Taka's bilateral exchange rate with the Dollar shows the highest increase in variability: i.e., eighteen times that of pre-1973 period. The lowest increase has occurred with respectto pound-sterling.[15] However, within the overall post-1973 period instability in bilateral rates were lower in the second period (April 76-Dec. 81) than in the first. This was because Bangladesh's exchange-rate-policy succeeded in stabilising Tk. =$ rate and the dollar itself was relatively more stable *vis-a-vis* other currencies. But in the second period all bilateral rates continued to be unstable, *albeit* at lower levels.

It is not surprising therefore, that the picture of instability does not change when movements in bilateral exchange-rates are averaged in some sense, over four most important currencies for Bangladesh's trade. This is because these two currencies (i.e., dollar and pound) denominate 86% of Bangladesh's total trade. Table III provides estimates of variability in the Taka's Effective Exchange Rate (EER). Even in terms of the average, instability increased eight-fold compared to the period of par-value fixed exchange-rate system.[16] However levels of variability in Taka's

[15]If post-1973 period is divided into two sub-periods (for reasons discussed in Section II)variability is lower in the latter period (April 76-Dec. 81) for both currencies, though its absolute level was still a few times that of pre-1973.

[16]This sort of increase in variability has been found in EERs of many low-income developing countries (Crockett & Nisouli 1977 ; Helleiner 1981).

TABLE III

INSTABILITY OF TAKA'S EFFECTIVE EXCHANGE RATE (EER) (%)

Pre-1973*	Post-1973	Period**	
		I	II
1.590	13.402	14.650	3.362

Source : For weights used in computing EER, see Currency-composition in Table I.

Note : *Pre-1973 estimates refer to the Pakistani Rupee for (1966-71) period using the same weights.
**Period I refers to March 1973-April 1976 ; Period II relates to April 1976—December 1981.

EER were not uniform over the entire period under study. Distinctly lower levels of instability in EER were experienced after April 1976. While for the first sub-period (upto March 1976) variability was nine times the level of pre-1973 it was only two-and-half to three times that level for the subsequent period of April-1976—December 1981 ; i.e., for the second sub-period Taka's EER was less unstable.

IV. IMPACT OF EXCHANGE RATE INSTABILITY

There is no doubt that the variability in the Taka's exchange rate has been the result of generalised floating. The question really revolves round whether such variability necessarily implies unpredictability. *Prima facie* as also on the basis of existing evidence[17] one could deem such instability, quite rightly as a proxy for enhanced uncertainty. In almost all cases, this emanates from the unpredictability of domestic-currency-values of individual international transactions. Variability in import-payments and export-receipts in the short-run and the intermediate term, makes it more difficult for both public and private sectors to plan their activities, manage their finances and choose between import-suppliers. It necessitates excessive premia on rapid acquisition and analysis of information, quick response, and considerable flexibility in production, trade and fianance. This places low-income countries like Bangladesh at a greater disadvantage, as they are least well-endowed with such capacities. In addition if there are wage or price ratchets operating, exchange-rate instability could lead to rapid inflation, though this has proved difficult to verify empirically. In short, both macro-economic management of the economy and micro-economic decision-making of firms are made more difficult as a result. The impact of exchange rate instability can be best examined under two heads : trade effects and portfolio effects.

17There have been various attempts to measure the degree of uncertainty implied by exchange-rate-instability by the extent of success with which forward-rates predict future spot-rates. All of these suggest a greatly reduced capacity of forward-rates to do so, in the period of generalised floating.

Trade Effects

These effects fall mainly on the level of international transactions, on its pattern and on the terms-of-trade. An attempt at estimating the impact could not be pursued for the first two,[18] but has been undertaken for the last.

Levels and Patterns of Trade

Increased instability in exchange rates, *ceteris paribus*, increase the risk of international trading. If the unit value for an export or import transaction is fixed for a particular contract-period in terms of a foreign currency (i.e., $, DM or Yen) against which the Taka fluctuates, it results in larger or smaller profits than expected, depending on the direction of change over that period. In the unlikely situation of an absence of risk-aversion, there will be costs, as fluctuating Taka-prices of traded goods make trade and investment responses both sluggish and erratic, because price signals become confused. However, with risk-aversion there will be clear financial and economic costs of participating in international trade. The trader will desire minimisation of variance between actual and expected unit value, in terms of domestic currency. They will attach a cost to this risk. Even if certain mechanisms and methods are used to cover for this risk, there will be both financial and non-financial costs of such efforts. Additional personnel to monitor changes, to undertake portfolio-choice and/or to take decisions, as also additional charges for forward-cover all imply direct costs. Various other disruptions in trade and production could also occur, because of decisions taken in anticipation of short-run changes in exchange rates (Richardson 1978). There are thus clear social costs. The last section highlighted the extent of instability in the Taka's exchange rate ; both bilateral and average, indicating significant anti-trade bias of floating. The reallocative effects resulting therefrom can, divert production away from exports with their uncertain prices towards non-traded products, even import substitutes, as also divert consumption away from imports towards non-traded items. Despite the overwhelming arguments indicating a reduction in the level of Bangladesh's trade-volume as a consequence of this instability, it was not possible to test it empirically. This was largely due to the difficulty of isolating the disincentives to trade resulting from increased exchange-rate variability from the myriad of other factors that also affect trade-volume.

It is expected that other things being equal, exchange-rate fluctuations would affect the direction and composition of trade. There could be diversion of trade in favour of countries whose currencies are relatively more stable. Similarly commodities and products whose prices are set in currencies that are relatively more stable could dominate composition of trade. However these effects will be weaker, the

[18]Even for developed countries it has been difficult to verify empirically the importance of these effects.

lower the correspondence between currency of country of origin/destination and the currency of invoice, as is the case in Bangladesh. In addition, a host of factors like competitiveness, marketing practices, tariff and non-tariff barriers, transnational activity, aid-flows and trade-policy affect the geographic and commodity composition of trade too.

Terms of Trade

The effect of exchange rate realignments on terms of trade is important, despite earlier writings to the contrary. It had been dismissed by most writers, on the ground that exchange-rate and (foreign-currency) export/import price changes were not independent determinants of the terms of trade. A perfect negative covariance between changes in price level and in exchange-rates were assumed on the basis of the 'Law of One Price' and the Purchasing Power Parity principle. Even recent work by Cline (1976) and Joshi (1979) have favoured the same view.[19] It was not until the work of Bautista and Riedel (forthcoming) that the existence of such effect was empirically established for the first time, under generalised floating, in their study of eleven developing countries.

It can be argued that when invoice-prices are set in major third currencies, as they usually are, depreciation in the value of currency in which exports are denominated and appreciation in the value of currency denominating imports, imply an involuntary deterioration in terms of trade. The net average effect of such changes need to be captured. The argument, of course, assumes that price changes and exchange-rate changes move independently of each other. In other words movements in exchange-rates do alter the real prices of individual country's imports and exports. There is adequate evidence to justify this assumption. Not only is the Law of One Price often broken (Isaard 1977), but in the short-to-medium term, Purchasing Power Parity also does not hold, under most conditions. (Genberg 1978 ; Kravis & Lipsey 1978). In periods of floating exchange-rates, differential rates of response of exchange-rates and commodity-prices of changes in growth of money and other determinants of prices, create deviations from Purchasing Power Parity. Foreign currency markets, being efficient asset-markets, quickly discount anticipated future changes in exchange-rates, but commodity markets, where arbitrage over time is less efficient, adjust current prices both slowly and weakly, to new information. Moreover, when shocks are non-monetary e.g., real) involving substantial changes in relative sectoral prices (Genberg 1978) deviations from Purchasing Power Parity relationship often persist beyond the short-to-medium term. Therefore increased instability in exchange-rates would imply enhanced instability in Bangladesh's terms of trade.

[19]That such an effect exists was acknowledged implictly when Baranson& Katseli (1980) devised rules for pegging, that could minimise the effect on terms of trade.

For estimating exchange-rate-effect on terms of trade the index used here is the one used by Bautista & Riedel (forthcoming). It is given by ERTOT=Exp $[a_i - b_i /(\log R_i)]$ where ERTOT is the exchange-rate-effect on terms of trade, and a_i and b_i are export and import weights respectively for the currency as defined before. R_i is an index of the exchange rate.

Table V shows estimates of trend (b) and variation around trend (S.E.E.) in ERTOT. TOT is the actual terms of trade of the country. It is evident that most of the instability in terms of trade emanated from relative price changes rather than floating exchange-rates.

TABLE V

	ERTOT		TOT	
	b	S.e.e.	b	S.e.e.
Mar. '73-Dec. '81	0.32070	0.04786	0.20118	0.17916
Mar. '73-Apr. '76	0.87657	0.01628	—	—

Note : All estimates derived from logarithmic trend equations are significant at 1 per cent level. S.e.e. is standard error of estimate derived from exponential trend of ERTOT and TOT where the first is the exchange-rate effect on terms of trade and the latter is terms of trade.

However for Bangladesh, the more important question in this respect is whether fluctuating exchange rates have had an adverse impact on her terms of trade. In view of the particular assymetry in currency-composition of Bangladesh's exports and imports, this could be an important-effect.

The first column of Table VI shows the estimates of exchange-rate-terms of trade (ERTOT) for each financial year with 1972/73 as base, suggesting continuously adverse exchange-rate effect on Bangladesh's terms of trade upto 1976/77.

It improved slightly after that, though the levels continued to be lower than the base year. This continuous adverse impact of exchange-rate-changes on terms of trade right upto 1976/77 was largely attributable to sterling's depreciation *vis-a-vis* the dollar over that period. Since most of Bangladesh exports were invoiced in pounds-sterling while imports were denominated in dollars,[20] a terms-of-trade deterioration became inevitable. The improvement since then was a result of two

[20]Upto 1975/76 more than 80% of exports and 30% of imports were denominated in pound sterling while 60% of imports and 20% of export were in dollars. By 1980/81 this had changed to 50% of exports and 10% of imports in pound while 76% of imports and 40% of exports were in dollars.

TABLE VI

TERMS OF TRADE (TOT) **& EXCHANGE RATE EFFECT** (ERTOT)

	ERTOT	TOT
1972/73	100	100
1973/74	98.8	67.9
1974/75	97.9	63.4
1975/76	91.6	57.5
1976/77	86.2	61.1
1977/78	88.5	71.2
1978/79	91.7	76.8
1979/80	95.4	80.3
1980/81	96.2	62.9

Source : (a) ERTOT computed on the basis of index given earlier.

(b) TOT obtained from (IBRD 1983).

changes. First, sterling's rate of exchange with dollar strengthened and improved and second, dollar's importance in exports rose to nearly two-fifth of total receipts, thereby reducing the extent of assymetry.

It is clear that the world of generalised floating did have a negative impact on the country's terms of trade (i.e., a 14% decline by 1976/77). Since exchange-rate and relative price effects can be treated as additive,[21] a comparison with actual terms of trade (in second column) shows that the former effect was of lesser significance than the effect of relative-price-changes. However, it did compound the problem of generally deteriorating terms of trade.

It is well-known that a decline in terms of trade implies an immediate loss in real resources. To the extent that an alternative policy could have prevented the adverse terms-of-trade-effect of exchange rate fluctuations, an estimate of the loss of resources would be indicative of the cost of such lapses in policy making. The estimates of terms-of-trade-loss of resources given in following Table VII, relate to the period upto 1976/77. It appears that Bangladesh experienced a cumulative

[21]Difference between ERTOT and TOT are ascribed to relative price effects, a ssuming zero covariance between exchange rate and relative price movements. In the a bsence of empirical estimates of covariance, this interpretation is tentative.

TABLE VII

LOSS DUE TO EXCHANGE RATE EFFECT ON TERMS OF TRADE ($ MILLION)

		72-73	73-74	74-75	75-76	76-77
1.	Trade Balance in Base Year Prices	425.8	284.2	458.0	347.8	119.5
2.	Trade Balance in Current Year Prices	425.8	555.3	1059.0	903.1	470.4
3.	(2) — (1)	—	271.1	601.0	555.3	350.9
4.	Imports of Base Year Volume at Current Year Prices	727.0	1140.6	1566.0	1423.5	1374.8
5.	Actual Imports	727.0	925.0	1403.0	1265.7	864.6
6.	(5) — (4)	—	215.6	163.0	157.8	510.2
7.	Total Terms of Trade (TOT) Loss (6) + (3)	—	486.7	764.0	713.1	861.1
8.	Exchange-Rate-Terms-of Trade-Loss (ERTOT)	—	18.2	43.8	140.9	305.5

Source : Computed from (IBRD 1983) and Table VI.

Note : Fall in ERTOT as percentage of fall in TOT (both shown in Table VI) is multiplied by (7) to obtain (8).

resource loss of about $ 500 million in four years, on account of the effect of exchange-rate fluctuations on terms of trade.

Portfolio Effects

In a world of generalised floating with uncertainty in domestic currency-values, stocks of assets and liabilities however denominated, are subject to appreciation and depreciation *vis-a-vis* other currencies. This situation has created problems for the managers of Bangladesh's reserves and foreign debt.

International Reserves

Bangladesh's foreign exchange reserves have been held in two currencies only upto 1973/74, (US dollars and UK pound) with reserves in Deutsche Mark appearing from 1974/75 and Japanese Yen from 1976/77. Table VIII provides the currency-composition of Bangladesh's reserves over time. It is evident that the currency-composition of reserves do not match that of payments for most of the years. To the extent that reserves finance import-payments because of cash-flow-problem or a

TABLE VIII

CURRENCY COMPOSITION OF FOREIGN EXCHANGE RESERVES (%)

	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81
Pound sterling	92.8	1.4	35.3	39.1	35.8	27.6	63.9	54.6	40.2
US Dollar	7.2	98.1	55.1	44.8	37.0	42.1	228.	24.2	50.4
Deutsche Mark	—	0.5	9.6	16.1	15.3	14.2	8.7	19.1	5.5
Japanese Yen	—	—	—	—	11.8	16.0	4.6	2.1	3.9

Source : Accounts Department, Bangladesh Bank.

Note : The percentages are derived from Taka-value of reserves provided by the above source. These percentages differ slightly if SDR-value of reserves is used, with each currency converted at end-June conversion rate of SDR.

shortfall in current export receipts, this mismatch could lead to "conversion-loss" in the event of an adverse change in exchange-rate. Similarly depreciation of a currency which is important in Bangladesh's protfolio of reserves would reduce the purchasing power of reserves held. In view of the very low-level of gross-reserves and the fact that net reserves for most of the years were negative, the scope for managing reserve portfolio on the basis of yield-considerations were obviously limited. The holding of pound-sterling in excess of payments-requirement was dictated largely by the accrual of export-receipts in that currency. For early years, such holdings proved lucrative as rates of return were higher for money-market instruments denominated in pound-sterling. However, the net benefit would depend on whether the total return on holdings was greater than the "capital-loss" incurred as a result of sterling's depreciation *vis-a-vis* dollar, especially since Bangladesh Bank did not take any forward-cover in international markets.

Debt

Similar issues arise in regard to external debt. There is even less control over the currency-composition of debt than there is over reserves. In fact, at any one time, the currency-denomination of external debt is given, and cannot be altered easily by a country like Bangladesh, as funds are not usually available to refinance the same debt in different currencies. However, since most of the external debt is of long-term nature, the exchange-risk applicable to the value of debt is not specific to floating. Increased short-run exchange-rate instability only affect short-term-payment obligations arising out of servicing that debt, because of the increased exchange-risk. The extent of such risk is greater, the greater the assymetry in currency-composition of reserves & export-receipts on one hand and that for debt-servicing on the other. Available evidence suggest that most of Bangladesh's annual debt-servicing obligations are denominated in dollars but the same is not the case with reserves and exports. The difficulties are obvious.

V. SOURCES OF INSTABILITY

It is intuitively obvious that the Taka's exchange-rate *vis-a-vis* any foreign currency, is determined by developments in foreign-exchange-markets outside Bangladesh's as also by decisions of Bangladesh authorities on changes in the pegged value of Taka. Therefore a part of exchange-rate instability is caused by realignments in rates between major currencies in international markets and another by adjustments in the peg. This will be true of every bilateral exchange rate of the Taka except the one with the peg-currency. However, such allocation of sources of instability will be useful in relation to an average effect. This section attempts to decompose the index of instability of the average rate i.e., EER, into its constituent parts. Brodsky in his pioneering work (Brodsky 1980, p. 372) decomposed the index of

instability of EER into two parts : first, that arising from changes in its own exchange-rate *vis-a-vis* its trading partners and second, that arising from the incremental effect of correlations in trend-corrected exchange-rates of its trading partners. Though changes in own exchange-rate *vis-a-vis* its trading partners are themselves actually composed of change in pegged-value undertaken by country's authorities on the one hand, and changes brought about by realignments of rates in foreign currency—markets outside the control of domestic authorities on the other, Brodsky has not distinguished between them. In that sense, this exercise seeks to extend Brodsky's methodology in order to evaluate the degree of flexibility in pegging that has been followed by Bangladesh authorities, as also their success or failure in reducing instability by means of such flexibility. Ability to distinguish between those two sources of change, would highlight the role of Bangladesh's exchange-rate policy in the actual instability of Taka's EER.

To decompose the instability index of effective exchange rate, into that additional component one can proceed in two stages. EER being a composite variable, can be reduced to a product of more elementary time-series. The index of EER is shown to be composed of two indices ; an index of adjustments in pegged-value and an index of realignments of exchange-rates between third currencies occurring in international markets. Second, the instability index itself is decomposed, using Brodsky's derivation (Brodsky 1980, p. 364-5) on that score. The effective exchange rate index with weights based on currency-shares of receipts and payments can be expressed formally as :

$$EER = r_1^{w1} \times r_2^{w2} \times r_3^{w3} \times r_4^{w4} \quad \ldots \quad (1)$$

Where r_1 = index of Tk/\$ rate, r_2 = index of Tk/¥ rate
r_3 = index of Tk/£ rate, r_4 = index of Tk/DM rate[22]

Since Taka was pegged to Pound sterling, the authorities of Bangladesh could adjust the pegged-value of Taka *vis-a-vis* pound as a matter of policy, even though exchange-rates of third-country-currencies would be determined via international currency markets. Taka's cross rates *vis-a-vis* those currencies would be determined through their exchange-rates with Pound.

The exchange rates of third currencies with pound sterling can be stated as follows :

$$\frac{\text{Tk}/£}{\text{Tk}/\$} = \frac{r_3}{r_1} = r^*_1 = \text{index of } \$/£ \text{ exchange rate}$$

22 The rate is expressed in terms of Taka per unit of the relevant currency.

$$\frac{Tk/£}{Tk/Y} = \frac{r_3}{r_2} = r^*_2 = \text{ index of } Y/£ \text{ exchange rate}$$

$$\frac{Tk/£}{Tk/DM} = \frac{r_3}{r_4} = r^*_4 = \text{ index of } DM/£ \text{ exchange rate}$$

Therefore :

$$r_1 = \frac{r_3}{r^*_1} \quad \ldots \quad (2)$$

$$r_2 = \frac{r_3}{r^*_2} \quad \ldots \quad (3)$$

$$r_4 = \frac{r_3}{r^*_4} \quad \ldots \quad (4)$$

Substituting (2), (3) and (4) in (1) we get

$$EER = \left(\frac{r_3}{r_1^*}\right)^{w1} \times \left(\frac{r_3}{r_2^*}\right)^{w2} \times r_3^{w2} \times \left(\frac{r_3}{r_4^*}\right)^{w4}$$

$$= \frac{(r_3)^{w1+w2+w3+w4}}{r_1^{*w1} \times r_2^{*w2} \times r^*_4{}^{w4}}$$

Since $\Sigma^w_i = 1$

$$EER = \frac{r_3}{r^*_1{}^{w1} \times r^*_2{}^{w2} \times r^*_4{}^{w4}} \quad \ldots \quad (5)$$

Expression (5) decomposes the index of EER into r_3 = index of Tk/£ exchange rate, i.e., the "index of peg-adjustment" (IPA) and $(r^*_1{}^{w1} \times r^*_2{}^{w2} \times r^*_4{}^{w4})$ i.e., "index of major-currency realignment" (ICR) i.e., realignments of currencies that are relevant to Bangladesh's international transactions).

Therefore, $EER = (IPA)\ (ICR)^{-1}$ ... (6)

The instability index of the composite EER can now be decomposed into three components[23] by applying Brodsky's decomposition to equation (6). The three

[23]In Brodsky (1980) instability index of EER is decomposed into two terms. The first term indicate that portion of instability that had arisen from changes in its own exchange rates *vis-a-vis* those of its trading partners ; the second showing incremental effect of correlations in the trend-corrected exchange-rates of the trading partners.

components are :

(i) Instability of IPA alone

(ii) instability of ICR alone

(iii) covariance of IPA and ICR which may increase or reduce the instability of the composite variable depending on the direction of variations in IPA and ICR.

Brodsky has shown that instability indices must have certain characteristics to be "decomposeable." For example an index, defined as the square of the standard error of estimate from a logarithmic trend equation, can be decomposed.

i.e., Index$= \frac{e_i}{n-u}$ where $e_i = \text{Log } Y_i - \text{Log } \overline{Y}_i = \text{Log} Y_i/\overline{Y}_i$

Where Q. instability is based on C_i as deviations from trend-value $\overline{Y}_i$

Being a multiplicative composite, it is decomposeable as follows :

$$I^2 (X^a Y^b) = a^2 I^2 (X) + b^2 I^2 (Y) + (2ab) \text{ Cov } (XY)^{24}$$

Applying the same to EER derived in(6) we have :

$$I^2 (EER) = I^2 (IPA) + I^2 (ICR) + 2 \text{ Cov (IPA ; ICR)} \ldots (7)$$

How does one interpret the decomposition implicit in equation (7) ? It has no doubt decomposed the variance of EER into variance of peg-adjustments (IPA), variance of the index of realignments in rates of non-peg currencies (ICR) and the covariance between the two.

Each of the first two terms indicate the extent of instability caused by each variable, when all others remain constant. The covariance-term captures the effect on total instability, when both variables change, indicating peg-adjustments in response to changes in currency realignments. Such responses can be off-setting (i.e., negatively correlated) in which case, the covariance term would reduce instability. This would imply policy-responses that have been "successful" in stabilising the EER. The reverse could also happen if peg-adjustments moved in the same direction as other changes. The covariance term would be positive, implying that the authorities' action has increased instability.

[24]Covariance, in this context, implies *trend corrected covariance* i.e., covariance of the residuals of a logarithmic trend. So for this model, a=1 ; b=1.

It is conceivable that the first term for peg-adjustment (i.e., IPA) would assume a value of zero if no changes in pegged values of Taka took place. Lack of such change however would not imply that Bangladesh authorities had no responsibility in the actual instability of EER that emanated. If the absence of such change has enhanced EER-instability, the covariance-term captures this effect, indicating failure of authorities to initiate off-setting changes. Thus the first and the third term of equation (7) provides on index of the degree of "responsibility" of the monetary authorities in the resulting instability of EER. Exchange-rate-policy which involves little or no peg-adjustments could, by virtue of such inaction be as much responsible for increased EER-instability, as frequent adjustments.

The second term (ICR) would be zero if there was a complete fixity of exchange relationship between third currencies in foreign-exchange-markets abroad. This of course, is impossible in a world of generalised floating, where realignment of rates occur more often than is warranted by changes in basic economic condition.

The above decomposition has been carried out with respect to Bangladesh's experience of generalised floating, to obtain new insight into the sources of instability in Taka's EER Using data on exchange rates (used in Section II) and the estimation-techniques suggested by Brodsky (1980) the results obtained are shown in Table IX.

The base month for the indices is, as before March 1973. Two separate estimations are done for the two relevant sub-periods of the post-1973 period.

TABLE IX

DECOMPOSITION OF INSTABILITY IN TAKA'S EER

Period	$(EER)^2$	=	$(IPA)^2$	+	$(ICR)^4$	+ Cov [IPA, ICR]
I. March 73-April 76	0.021331	=	0.017195 (80.6)	+	0.00647 (3.03)	+ 0.003489 (16.4)
II. April 76-Dec 81	0.001132	=	0.002248 (218)	+	0.002472 (206)	— 0.003588 (324)

Source : Estimates of EER of Table III used.

Notes : *Instability index that has been decomposed is the square of the standard error of estimate (i.e. ,variance) since it is that index which can be subject to decomposition.

Figures in parenthesis indicate percentage of total instability in EER.

The results shown in the table clearly suggest distinctly different experience in the two sub-periods. This is manifest in the parameters of all three components,

but most strikingly in that of the covariance term. In the first sub-period upto April 1976, the covariance term contributed significantly to increased instability in EER, i.e., changes in the peg or lack of it, aggravated third-currency-realignments. This appears to be largely a result of an absence of an active exchange-rate policy. Pegs were changed on few occassions and that too not for stabilising the EER or any other currency value. Peg adjustments then, not only failed to off-set the fluctuations in Taka's cross-rates as a result of exchange-rate change in international markets but often aggravated it. This is evident from the contribution of the first term (i.e., IPA) and the positive sign of the covariance term.

For the subsequent period, adjustments in pegged value of Taka were very frequent (38 times in 64 months), which is reflected in the exceptionally large value of the first term (IPA). Such frequent changes were the result of Bangladesh's flexible exchange-rate policy adopted over this period. The important issue is whether these changes off-set the equally frequent changes in exchange rates of other currencies, evident from the value of the second term. It is known (Bangladesh Bank 1977) that these frequent changes were undertaken with the objective of stabilising Taka's bilateral exchange rate with the dollar and therefore to some extent the import bill. The value and sign of the third term clearly shows that such adjustments made a very significant impact in reducing instability in the Taka's EER. The level of EER-instability for this period was a quarter of the first sub-period. Bangladesh authorities were thus quite successful in changing the peg in directions that offset excessive fluctuations of exchange rates in international markets. However, notwithstanding this success, it is obvious that absolute levels of instability in the Taka's EER as also in its bilateral exchange rates remained high even in this second sub-period. In other words despite this relative success in the second sub-period, the country was not spared the macro and micro-economic costs of instability as were of the rates proved stable for any length of time.

VI. POLICY OPTIONS

It is true that independent floating is neither desirable nor feasible in developing countries. Nevertheless, there is no way that a country can have a fixed exchange-rate, when all major currencies are floating against one another. In other words, the issue of exchange-rate-policy in a world of generalised floating is not resolved by a decision to peg[25] rather than to float. Pegging to any currency does not obviate fluctuations *vis-a-vis* other floating currencies and also non-floating currencies which are pegged to a different unit. It is because of this difficulty that a significant literature has emerged on the problem of pegging, under this new exchange-rate-regime.

[25]Peg implies fixation of domestic currency's exchange-rate with a particular major currency, which is then used as a pivot for determining other rates.

That a country like Bangladesh should peg its currency cannot be in doubt. However, a mere decision to peg the Taka cannot be made operational until answers to the following questions are found :

—Which major currency should taka be pegged to ?

—What criteria should be used to alter the value of peg ?

—How often should the value of peg be altered ?

In the literature and elsewhere, pegging to a single currency or to a composite (involving a basket of currencies) are often seen as alternatives. This is misleading, if only because a peg, of necessity has to be a major currency whereas a composite (e.g., EER) can at best provide the basis for altering the peg. The choice of pge is therefore among a few major national currencies. This is because the Taka needs to be pegged to a currency that has a large active and recognised foreign-exchange-market since it itself is not internationally traded. Only by using the peg-currency as a pivot, can one derive the Taka's bilateral cross-rates *vis-a-vis* other major and non-peg currencies.[26] Any composite unit composed of a weighted basket of currencies (e.g., EER) having an initial relationship with the Taka[27] is at best, a criterion for altering the pegged value of the Taka. Movements in the Taka's value *vis-a-vis* that composite could provide the basis for adjusting the value of the peg. Whether this would be the only basis for change, would depend on the objectives of exchange-rate-policy. It is conceivable that the Taka and the composite could be made to have a one-to-one relationship i.e., any change in the Taka value of the composite would lead to equivalent offsetting changes in the value of the peg so as to keep its composite (EER) value constant.[28] But this could necessitate excessively frequent changes in the pegged value of the Taka which is certainly undesirable.

Exchange-Rate Policy

Bangladesh entered the world of generalised floating with no basic change in its exchange-rate policy. The authorities not only continued to peg the Taka

[26]The peg-currency is also the one that has to be used for intervention (if any)in the foreign-exchange-market.

[27]Even the initial relationship of the Taka with the composite can only be derived by using the peg-currency, to obtain Taka's cross-rates.

[28]This would be the equivalent to tying Taka to a constant value of the composite (EER). Bangladesh's use of a weighted basket could not be equated with it. The objectives of using a basket could also be to have continuous depreciation of Taka *vis-a-vis* the composite, or appreciation ; the rate of depreciation/appreciation being governed by some other criteria.

to pound-sterling, but also did not alter the value of the peg except on very few occassions upto March 1976. In other words Taka's cross-rates with other major currencies (e.g., $ DM JY) were determined solely by changes in the pounds' exchange rate *vis-a-vis* those currencies. The volatility of the pounds' exchange rate with the dollar, in particular its overall depreciation, was affecting Taka's EER and its bilateral exchange rates adversely. Thus the authorities shifted to a more flexible exchange-rate-policy from April 1976, which was expected to "promote a stable system of exchange rates" [Bangladesh Bank (1975/76), p. 73]. In fact, frequent changes in pegged value of the Taka were carried out "in order to maintain stable cross-rates of Bangladesh Taka in relation to U.S. dollar" [Bangladesh Bank (1977/78) p. 103].[29] After August 1979 Bangladesh "switched over to a basket-method of exchange rate determination". [Bangladesh Bank (1979/80) p. 123]. The basket consisted of four currencies ($, £, DM & JY) most important to Bangladesh's trade, with weights based on currency-composition of trade. This was to be the basis for altering the value of the Taka's peg.[30] The objective of adopting this method is not evident from official documents. In one report, it is claimed [Bangladesh Bank (1979/80) p. 123] that such a shift was undertaken "to impart greater stability to exchange rate of Taka". But there is no indication as to whether this refers to bilateral-exchange-rates or to EER. One could assume that it relates to Taka's bilateral rate with dollar since earlier reports cite this to be the main focus for most of the thirtyfour peg-adjustments made over the period April 76—Dec.'81, which included revaluations *vis-a-vis* the pound.[31] While frequent peg-adjustments did reduce instability both in Taka's EER and its bilateral rate with the dollar, absolute levels of instability remained high (refer Section V). If stabilising Taka's exchange rate with the dollar was the prime objective of adjustments in Taka's pegged rate with the pound, it is surprising that Bangladesh did not adopt a more direct method of pegging Taka to the dollar. It could have helped Bangladesh to attain that goal much more easily and at much less cost.

Earlier sections have demonstrated that over the period under study (March 73—Dec.'81) both Taka's effective exchange rate (EER) and its bilateral exchange-rates have been highly unstable. More importantly it was found that equal improvement in stability could not be achieved for both types of rates despite effective policy in the second period. Even if changes in the value of the peg helped to offset com-

29The need for a stable bilateral rate with dollar was deemed so compelling that a floor and ceiling for Tk.=$ rate was invoked, independent of the actual cross-rates for dollar [B. Bank (1977/78 p. 104].

30Alterations in peg-value was to be undertaken only if Taka's EER-index, based on the basket, were to change by 2.5%. Later the margin was reduced to 1%.

31With more than half of total exports denominated in pound-sterling and no upward revision in foreign prices, (certainly for jute) considerable disincentive effect on exporters must have occured, despite its transient nature.

pletely the fluctuations engendered externally, so as to fully stabilise the EER, it could only imply improved stability for certain macro-economic variables. Instability in bilateral rates *vis-a-vis* particular currencies proved inescapable. Since decisions of individuals and firms relate to bilateral rates, micro-economic costs of uncertainty and risk would be incurred so long as bilateral rates are highly unstable. Table X shows levels of instability in the Taka's bilateral exchange rates *vis-a-vis* the four major currencies, even under conditions where Taka's EER, was completely stabilised.

TABLE X

INSTABILITY OF TAKA'S BILATERAL RATES (%) UNDER CONSTANT EER

Vis-a-Vis	Post-1973	Period I	Period II
US Dollar	4.954	1.723	3.441
UK. Pound	7.326	2.543	4.972
D-Mark	9.182	4.544	8.930
J-Yen	9.157	3.323	9.574

Note : EER is held constant by altering the value of the peg to the extent required. Instability indices (normalised standard-error estimates) relate to bilateral exchange rates derived through that peg value.

It is interesting to compare the above indices for post-1973 with the actual levels of instability in bilateral rates shown in Table II. Under a constant EER the variability of Taka's exchange rate with pound has increased compared to actual levels in that period. The one for U.S. dollar has improved but still remains unstable. Therefore stabilising EER cannot eliminate micro-economic instability resulting from fluctuations in bilateral rates. Similarly a peg with any one currency, if maintained unchanged stabilises that particular bilateral-rate. Transactors in that currency-market avoid the risk and uncertainty, but only at the cost of instability in EER and other cross-rates. This would be true so long as there is turbulence in international foreign-exchange markets.

Options

It is obvious that all rates cannot be equally stable or fully stabilised. Thus a choice will have to be made on the basis of a trade-off. The critical question for

Bangladesh is whether there is a currency-peg wherein the advantages of one stable bilateral exchange rate of the Taka resulting from that peg can compensate for a less stable EER. Conversely, whether benefits from a fully stable and constant EER can offset the disadvantages of instability in every bilateral exchange rate of the Taka. Despite the difficulty of evaluating the two options, it would perhaps not be incorrect to presume that a fully stable and constant EER, though theoretically feasible, is practically undesirable. This is because of the excessive frequency of changes in peg that this would require, in view of the present turbulence in foreign-exchange-markets abroad. Such excessive destabilisation of the peg-rate implies increased risk and uncertainty for exporters and importers, apart from the administrative impracticability of making these changes. Thus this option virtually reduces to one of stabilising EER within a certain range and not complete constancy. In other words, under this option, all the rates (e.g., EER, the peg-value and other bilateral cross-rates of Taka) would fluctuate. Such a situation becomes difficult to evaluate in any meaningful sense, relative to the alternative option.

Moreover, it is quite evident from Table I that Bangladesh does not have a diversified currency-composition of trade. In effect only two currencies denominate nearly nine tenths of total trade, with the other two playing a peripheral role.

The upshot of this discussion is that in view of Bangladesh's relatively undiversified currency-composition and the difficulty of fully stabilising an EER-index, stabilising a single but important bilateral exchange rate through a stable peg is the only option. There are only two relevant choices of peg-currency i.e., dollar or pound-sterling.

Though Bangladesh had pegged Taka to the pound, on any of the conventional criterion, the dollar should have suggested itself as the optimal choice. This is for three reasons. First in terms of a currency's importance to trade, dollar qualifies admirably, denominating 76% of imports and 40% of exports as of 1980/81. Second, with regard to relative stability of the two currencies, dollar out-performs the pound for the period under study. Table XI shows a much lower instability in Taka's EER when Taka is pegged to the dollar than when pegged to pound sterling, indicating that dollar has been relatively more stable than pound in international currency-markets. In other words, under dollar-peg, not only will 76% of import transactions and 40% of export-trade face no uncertainty in respect of domestic currency-values of their invoices, but would also have imparted greater stability to macro-economic variables by virtue of the lower instability in EER that this would imply. Third, since cross-rates of Taka with other minor currencies are determined through peg-currencies, pegging to a currency which is used as a peg by most countries, makes for greater stability in those cross-rates. An examination of currencies used for pegging reveal 40 countries with dollar-peg but only 3

countries having pound-pegs (IMF 1982). The advantage of a dollar-peg appears obvious for these reasons.

TABLE XI

EER-INSTABILITY UNDER LALTERNATIVE PEGS

	Pound-peg	Dollar-peg
March 73—April 76	1.64	0.30
April 76—Dec. 81	1.17	0.72

Note : For each currency-peg, the value of the peg was kept at the level of March 1973, in order to isolate the effect of the specific instability of that particular currency.

In addition, the level of instability in EER of Taka is expected to decline over time under a dollar-peg. This is because the dollar's weight in currency-composition of trade would increase, as exporters would switch to dollar-invoicing, in order to avoid the exchange-risk implicit in denominating a contract in a non-peg-currency. Since a very large part of the EER-currency-basket would come to consist of dollars, a stable dollar-peg cannot imply a very unstable EER of Taka. Moreover the shift to dollar-invoicing would not only mean stability in value of transactions for most of Bangladesh's trade but would also imply reduced instability in terms of trade and less possibility of its deterioration, despite exchange-rate fluctuations. Management of reserves would be facilitated as it would be less subject to exchange-risk because of the emerging symmetry between currency of export-receipts and uses of reserves.

The only text-book objection to such dependence on a particular peg-currency is the possibility of trade-diversion in favour of the country where currency is used as a stable peg. This argument was premised on the assumption that there is a close correspondence between geographic composition and currency-composition of trade. Since the dollar is used for invoicing Bangladesh's trade irrespective of the country of origin for imports and of destination for exports the possibility of such a trade-diversion-bias is remote even under a dollar-peg.

The foregoing reveals the wisdom of a policy of pegging the Taka to the dollar, at least to overcome the adverse effects of instability in the Taka's exchange-rates emanating from turbulence in international currency-markets under generalised floating.

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Land Concentration and Dispossession in Two Villages of Bangladesh

by

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The paper presents a set of dynamic data (1951-81) on the concentration and dispossession of landownership/control in two villages of Bangladesh. Based on a prolonged and indepth fieldwork, the investigation reveals that richer households have been enlarging their share on the ownership/control of agricultural land at the expense of the poorer ones. The middle peasantry was also under tremendous economic pressure. A clear process of disintegration of the peasantry is certainly on.

I. INTRODUCTION

Much has been written about rural poverty, landlessness and rural income inequality in Bangladesh in recent times (Khan 1976 ; 1977 ; Islam 1979 ; Osmani and Rahman 1981 ; Ahmad and Hossain 1983). Most of these studies, with one or two honourable exceptions, are based on macro-level, often inconsistent, published data. We have seen some micro-level studies as well (Hossain 1977 ; Rahman 1979 ; Jahangir 1979 ; Siddiqui 1980 etc.). However, the majority of these studies are again based on one-shot short survey data and miss the dynamic dimensions of rural society.

This paper, therefore, makes a modest attempt to fill some of these research gaps. It is based on a set or dynamic data from two villages of Bangladesh. The data were collected through prolonged and indepth field work (for selection of the villages and the methodologies of data collection see Rahman (1983 : Appendix A). The objective of the paper is to highlight the depressing trend of land concentration in a few hands and the impoverishment of the many in two villages only. In fact, we plan to compare the land/man relations of these villages from a historical perspective. We will thus present the distribution of different categories of land for three different cut-off periods : the 1980s, 1970s and 1950s. The emerging pattern is, of course, acute concentration and dispossession of land amongst rural households. While no rigorous attempt has been made to explain why this is happen-

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ing, the purpose of the paper is to quantify the nature of the concentration and dispossession.

II. THE CHANGING LANDHOLDING PATTERN : 1951-81

In the early 1950s, everything was in a flux in the then East Pakistan (today's Bangladesh). Following Partition in 1947 and the creation of Pakistan, there was a great deal of emigration of rich Hindu families (most of them being former *Zamindars, Talukdars* and *Jotedars*) out of our study areas to India. Also a few Muslim families from Assam and other eastern districts of India migrated into those villages. Around that time there were frequent communal riots, land grabbing by rich *raiyats* and transfer of many assets. Shorty after Partition came the *East Bengal State Acquisition and Tenancy Act of 1950* (henceforth EBSATA) in the light of the recommendations of the Floud Commission (Floud 1940).

Village 1 was not affected significantly in terms of the distribution of ownership rights of land by this Act. There were no resident *Zamindars* or their agents in this village. The *raiyats* just became *maliks*—a change of status which did not alter in effect the distribution of landholdings. In a few cases, the rich Muslim *raiyats* gained some land from their Hindu counterparts who decided to leave the village to settle in India. The price paid for this land was, indeed, very nominal, as always is the case with this type of distress sale.

But drastic changes were observed in village 2. There were two small *Zamindars* in this village enjoying titles to at least three hundred acres of land (not necessarily within the boundary of village 2) in the pre-*EBSATA* period. They lost their control over the *Zamindari* lands and became ordinary landowners. Their *raiyats,* who actually cultivated the lands earlier,became the *maliks* (i.e., land owners).

Significant changes were noted in the landholding pattern in both villages in the 1960s and 1970s. The concentration of land in the hands of a few was seen to have increased over time in both villages,though the magnitude of that concentration varied from village to village.

The mid-1960s saw the beginning of the 'Green Revolution' in rural Bangladesh. But none of our study villages seems to have been affected by that early dose of 'Green Revolution'.

The war of liberation in the early 1970s brought many changes in rural Bangladesh. The new government announced a new land reform bill. More modern agricultural inputs such as pumps, fertilizer, insecticides, seeds etc. were made available to the cultivators. Village 1 seems to have benefited more from the later dose

of 'Green Revolution' and consequently has undergone the tremendous stress and strain of income inequalities that usually follow such an inflow of modern inputs (Byres 1972, 1981 ; Griffin 1974 : 51-59). Village 2 witnessed very little of this inffow. Simultaneously, population has increased quite fast in both villages during the last thirty years and the impact of this demographic explosion can be seen in the declining per capita share of land.

We draw these conclusions from the data we collected during our field work. Tables IA and IB give us an average picture of changing patterrn of land-man relations over the period 1951-1981.

We notice from Tables IA and IB a steady increase in the number of households and population in both villages with a simultaneous decline in average land owned per household and per capita.

Thus we can see an average picture which has been deteriorating secularly. However, this average picture can be quite misleading. Not all households lost their economic strength. In fact, a section of them gained more economic strength by acquiring more land through buying, mortgaging and renting in more operated land. When we distribute the households into 9 empirical categories we find a highly differential picture.

Table IIA and IIB give us that heterogeneous picture.

Tables IIA and IIB show a wide range of changes that have been proceeding in both villages since the early 1950s.

The proportion of households in the landless and the land-poor groups swelled whereas that in the land-rich groups in fact ebbed over the last three decades :

(i) The proportion of households owning less than .50 acres of land (including the landless ones) increased sharply from about 14% in 1951 to about 31% in 1972 and finally to 41% in 1981. The corresponding figures for village 2 are 12%, 16% and 41%.[1]

(ii) The burden of supporting additional mouths by the marginal households also increased steadily during this time. Thus the above two groups together constituted about 14% of the population of village 1 in 1951. The proportion increased to 26% in 1972 and to 30% in 1981. The coresponding population figures for village 2 are 7%, 13% and 32%.

[1]The figure for 1981 looks vastly exaggerated because of the families who migrated into Village 2 in the early 1970s.

TABLE IA

VILLAGE 1 : **THE GROWTH IN THE NUMBER OF HOUSEHOLDS, POPULATION AND THE SIZE OF LAND OWNERSHIP : 1951-81**

	Items	1951	1972	1981	% Change (1951-1972)	Annual % Change (1951-1972)	% Change (1972-1981)	Annual % Change (1972-1981)
1.	No. of HH	138	173	200	+25.36	+1.20	+15.60	+1.73
2.	Population	566	873	1183	+54.24	+2.85	+35.51	+3.94
3.	Average household size (members per HH)	4.10	5.04	5.91	+22.92	+1.09	+17.26	+1.91
4.	Average land owned per household (in acres)	4.12	2.66	2.18	−35.43	−1.68	−18.04	−2.00
5.	Average land owned per capita (in acres)	1.00	.52	.37	−48.00	−2.28	−40.54	−4.50

Note : HH=Household.

TABLE IB

VILLAGE 2 : **THE GROWTH IN THE NUMBER OF HOUSEHOLDS, POPULATION AND THE SIZE OF LAND OWNERSHIP : 1951-81**

	Items	1951	1972	1981	% Change (1951-1972)	Annual % Change (1951-1972)	% Change (1972-1981)	Annual % Change (1972-1981)
1.	No. of HH	51	81	121	+58.82	+2.80	+49.38	+5.48
2.	Population	220	379	656	+72.27	+3.44	+73.08	+8.12
3.	Average household size (members per HH)	4.31	4.68	5.42	+8.58	+.41	+15.81	+1.75
4.	Average land owned per household (in acres)	5.89*	3.78	2.76	−35.82	−1.70	−26.98	−2.99
5.	Average land owned per capita (in acres)	1.36	.81	.51	−40.44	−1.92	−37.03	−4.11

Note : HH Household.

*Mukherjee found the average land owned per household for the interior villages (village-2 was one of them) as 6.1 acres in 1942.

TABLE IIA

VILLAGE 1 : **LAND-MAN RELATIONS BY LANDOWNERSHIP GROUPS : 1951-1981**

Land Ownership Groups (acres)	No. of Households			Population			Total Land Owned (acres)			Land Owned Per Household (acres)			Land Owned Per Capita (acres)		
	1951	1972	1981	1951	1972	1981	1951	1972	1981	1951	1972	1981	1951	1972	1981
1. 0	4 (2.90)	8 (4.62)	12 (6.00)	27 (4.77)	34 (3.89)	50 (4.23)	0 (0)	0 (0)	0 (0)	0	0	0	0	0	0
2. .01-.50	15 (10.86)	45 (26.01)	70 (35.00)	55 (9.72)	196 (22.45)	301 (25.44)	2.20 (.38)	12.49 (2.71)	13.39 (3.06)	.14	.27	.19	.04	.06	.04
3. .51-1.50	14 (10.14)	26 (15.03)	37 (18.50)	37 (6.53)	119 (13.63)	202 (17.07)	12.08 (2.12)	27.24 (5.92)	37.52 (8.59)	.86	1.04	1.01	.32	.22	.18
4. 1.51-2.50	26 (18.84)	37 (21.39)	33 (16.50)	86 (15.19)	190 (21.76)	201 (16.99)	49.93 (8.77)	75.44 (16.38)	67.00 (15.33)	1.92	2.03	2.03	.58	.39	.33
5. 2.51-3.50	16 (11.59)	18 (10.40)	12 (3.00)	61 (10.78)	100 (11.45)	98 (8.28)	45.16 (7.94)	54.33 (11.84)	35.42 (8.11)	2.82	3.03	2.95	.74	.54	.36
6. 3.51-5.00	27 (19.57)	18 (10.40)	14 (7.00)	117 (20.67)	98 (11.22)	108 (9.13)	113.87 (20.00)	76.24 (16.56)	62.97 (14.41)	4.22	4.23	4.49	.97	.77	.58
7. 5.01-7.50	13 (9.42)	7 (4.05)	7 (3.50)	60 (10.60)	35 (4.01)	72 (6.09)	75.02 (13.18)	46.22 (10.04)	44.96 (10.29)	5.77	6.60	6.42	1.25	1.32	.62
8. 7.51-10.00	10 (7.25)	7 (4.05)	9 (4.50)	55 (9.72)	44 (5.04)	93 (7.86)	81.82 (14.38)	60.70 (13.18)	81.00 (18.54)	8.18	8.67	9.00	1.48	1.38	.87
9. 10.01+	13 (9.42)	7 (4.05)	6 (3.00)	68 (12.01)	57 (6.54)	58 (4.90)	189.00 (33.21)	107.50 (23.35)	94.66 (21.66)	14.54	15.35	15.77	2.77	1.88	1.63
All Groups	138 (99.99)	173 (100.00)	200 (100.00)	556 (99.99)	873 (99.99)	1183 (99.99)	569.08 (99.99)	460.36 (99.98)	436.93 (99.99)	4.12	2.66	2.18	1.00	.52	.37

Note : Figures in the parentheses show percentages. Percentage figures do not always add up to 100.00 because of rounding off error.

TABLE IIB

VILLAGE 2 : **LAND-MAN RELATIONS BY LANDOWNERSHIP GROUPS : 1951-1981**

Land Ownership Groups	No. of Households			Population			Total Land Owner (acres)			Land Owned Per Household (acres)			Land Owned Per Capita (acres)		
	1951	1972	1981	1951	1972	1981	1951	1972	1981	1951	1972	1981	1951	1972	1981
1. 0	3 (5.88)	11 (13.58)	29 (23.97)	7 (3.18)	39 (10.29)	118 (17.99)	0 (0)	0 (0)	0 (0)	0	0	0	0	0	0
2. .01-.50	3 (5.88)	3 (3.70)	21 (17.35)	10 (4.54)	12 (3.17)	95 (14.48)	1.12 (.37)	1.05 (.34)	6.39 (1.90)	.35	.35	.30	.11	.08	.06
3.51-1.50	8 (15.69)	13 (16.05)	15 (12.40)	30 (13.62)	53 (13.98)	85 (12.96)	8.24 (2.74)	11.03 (3.60)	16.73 (5.00)	1.03	.84	1.11	.27	.20	.19
4.1.51-2.50	3 (5.88)	17 (20.99)	18 (14.87)	12 (5.45)	65 (17.15)	92 (14.02)	6.13 (2.04)	33.68 (11.31)	36.03 (10.76)	2.04	2.04	2.00	.51	.53	.39
5.2.51-3.50	5 (9.80)	11 (13.58)	14 (11.57)	18 (8.18)	45 (11.87)	75 (11.43)	14.78 (4.91)	33.08 (10.78)	42.85 (12.80)	2.95	3.00	3.06	.82	.73	.57
6.3.51-5.00	7 (13.72)	10 (12.35)	9 (7.44)	24 (10.91)	51 (13.45)	55 (8.38)	32.21 (10.71)	44.88 (14.63)	36.60 (10.94)	4.60	4.48	4.06	1.34	.88	.66
7.5.01-7.50	7 (13.72)	8 (9.87)	7 (5.78)	28 (12.73)	46 (12.14)	49 (7.47)	42.33 (14.04)	52.09 (16.98)	43.62 (13.03)	6.04	6.51	6.23	1.51	1.13	.89
8. 7.51-10.00	6 (11.76)	2 (2.47)	2 (1.65)	25 (11.36)	13 (3.43)	16 (2.44)	51.89 (17.25)	16.57 (5.40)	17.66 (5.27)	2.65	8.28	8.83	2.07	1.27	1.10
9. 10.01+	9 (17.65)	6 (7.40)	6 (4.96)	66 (30.00)	55 (14.51)	71 (10.82)	144.15 (47.92)	113.31 (36.95)	134.80 (40.28)	16.01	18.88	22.46	2.18	2.06	1.89
All Groups	51 (99.98)	81 (99.99)	121 (99.99)	220 (99.97)	379 (99.99)	656 (99.99)	300.85 (99.98)	306.69 (99.99)	334.68 (99.98)	5.89	3.78	2.76	1.36	.81	.51

Note : Figures in the brackets show percentages. Percentage figures do not always add up to 100.00 because of rounding off error.

(iii) But the total land owned by this poorest section of the peasantry did not increase at the same pace. In village 1 they owned 0.38% of the total land in 1951. This increased to 2.37% in 1972 and 3.06% in 1981. The corresponding figures for village 2 are 0.37%, .34% and 1.90%. And most of this land was in fact homestead land. The decline in their economic position becomes clearer when we consider the per household and per capita figures. The per capita figure declined more drastically than the per household figure. The extent of this decline was greater in the period 1972-81 than in 1951-72. It is true that the per capita figures declined for almost all groups, but the magnitude of the dispossession was certainly much higher in the landpoor groups. This is true for both the villages.

(iv) By contrast, we notice a significant decline in the proportion of households but not in the proportion of land owned by richer groups. In fact, there is a sharp increase in their share in the seventies. Thus, we see that groups 8 and 9 together constituted about 16% of households of village 1 and owned about 47% of land in 1951. By 1972, though the proportion of households in these two groups declined by half their share of land declined by only 11%. By 1981, they constituted only 7.50% of total households and owned more than 40% of total land. Similarly in village 2, groups 8 and 9 together comprised about 29% of households in 1951. This proportion declined drastically to about 10% in 1972 and to about 7% in 1981. Although their proportion of total households shrank, their share of owned land did not decrease proportionately. These two groups together owned about 65% of land in 1951.[2] Their share dropped to 42% in 1972 and again increased to 45% in 1981.

The per household figures increased in both the villages. However, there has been some decline in the per capita land due to overall increase in the population. But on the whole we notice positive indices of economic strength in these land-rich groups.

(v) In the middle groups, say groups 5, 6 and 7, there has been significant decline in the proportion of households and also the share of the land. These are the households which have been under tremendous pressure to disintegrate and in most cases the disintegrated households fell down the scale.

It is claimed by some scholars that although there exists considerable inequality in the distribution of owned land, land is generally cultivated in small and medium size family based holdings (see for example Hossain 1981 : 24). They argue that

[2]In a way the distribution of land was less skewed in the early 1950s than in the 1940s. Mukherjee noted that 14% of households in the interior village owned less than one acre, 45% between 1 and 5 acres, 20% between 5 and 10 acres and 21% owned more than 10 acres in 1942 (Mukherjee 1957 : 84). It may be mentioned that according to our findings the proportion of households owning more than 10 acres of land was 17.65%.

the majority of small landowners rent in land from others to cultivate a larger size of holding than their ownership of cultivable land would permit. Similarly, many large landowners are said to rent out a part of their holdings to others and cultivate a holding smaller in size than the actual size of their ownership. Also, there are many landowners, especially the poorer ones, who rent out their entire holding and engage in non-farming activities. Because of this pattern of land transfer through the rental market, Hossain argues that the distribution of operated land is much less unequal than the distribution of owned land (Hossain 1981 : 24).

But our data do not entirely support the above suggestion. In fact, even after the effective adjustments of rental shares, the distribution of land remains highly unequal in both villages.[3] To test this hypothesis, we have taken nine land owning groups as the basic reference groups and then distributed various types of land (owned cultivated, operated and effective) among these groups. We first examine the command over these different categories of land by each of those nine groups in village 1. Tables III, IV and V give the details.

(1) Table III is almost similar to Table IIA, only the extent of inequality is slightly greater. The share of the poorer groups (say the first 2 groups) in Table III is much less than that shown in Table IIA. This may be because of the homestead land, which we excluded while computing owned cultivable land. The situation has worsened for the poorer groups in the last decade. As for the richer groups (say groups 8 and 9) there was an initial decline in overall share in the period between 1951-72 (of course, the number of households also declined in these groups) and the share has increased in the 1970s.

(2) As shown in Table IV, the situation is quite different when we consider command over operated land. No doubt the distribution is less skewed than that shown in Table III, but the inequality is still high enough to cause concern. What is more disturbing is that the proportion of operated land has been swelling in the richer groups and falling in the poorer groups. The same thing is true for per capita figures. Thus except in group 1 (where the percentage of operated land has, in fact, increased over time), most of the other poorer groups (say groups 2 and 3 and 4) lost some of their operated land in the 1970s. The richer groups have been resuming some of their land from the tenants to cultivate it with the help of hired labourers under their own supervision. In the 1950s and the early 1960s more people

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[3]This adjustment is made as follows :

Effective Land size=Net Operated Land
=Owned Cultivated Land
+½(sharecropped in—Sharecropped out) land
+(Land leased-in under Fixed Rent—Land Leased-out under Fixed Rent).

TABLE III

VILLAGE 1 : **COMMAND OVER OWNED CULTIVABLE LAND BY LANDOWNERSHIP GROUPS : 1951-1981**

Group Number	Basic Land Ownership Groups (acres)	% of Total Owned Cultivable Land			Owned Cultivable Per HH (acres)			Owned Cultivable Per Capita (acre)		
		1951	1972	1981	1951	1972	1981	1951	1972	1981
1.	0	0	0	0	0	0	0	0	0	0
2.	.01-.50	.16	2.37	1.82	.05	.22	.10	.01	.05	.02
3.	.51-1.50	1.94	5.97	7.78	.69	.97	.84	.26	.21	.15
4.	1.51-2.50	8.90	16.31	15.16	1.72	1.87	1.84	.52	.36	.30
5.	2.51-3.50	8.18	11.68	8.08	2.57	2.75	2.69	.67	.49	.33
6.	3.51-5.00	20.58	17.35	14.36	3.84	4.07	4.10	.88	.75	.53
7.	5.01-7.50	13.82	10.16	10.48	5.36	6.15	5.99	1.16	1.23	.58
8.	7.51-10.00	14.08	13.39	19.35	7.10	8.11	8.00	1.29	1.29	.83
9.	10.01 and above	32.32	22.75	22.95	12.53	13.78	15.30	2.39	1.69	1.58
	All Groups	99.98	99.98	99.98	3.65	2.45	2.00	.89	.48	.34

Note : HH=Households

Percentage figures do not always add up to 100.00% because of rounding off error.

TABLE IV

VILLAGE 1 : **COMMAND OVER OPERATED LAND BY LAND OWNERSHIP GROUPS : 1951-1981**

Landownership Groups	% of Operated Land			Operated Land/HH			Operated Land/Capita		
	1951	1972	1981	1951	1972	1981	1951	1972	1981
1.	0	.40	1.85	0	.22	.64	0	.05	.15
2.	1.68	4.23	3.77	.51	.40	.22	.13	.09	.05
3.	2.90	9.20	9.08	.95	1.56	1.03	.36	.34	.19
4.	11.93	17.97	15.11	2.11	2.15	1.92	.63	.42	.31
5.	9.19	13.65	7.35	2.66	3.36	2.57	.69	.60	.31
6.	21.84	16.53	14.37	3.72	4.06	4.30	.85	.74	.55
7.	13.11	9.23	10.24	4.63	5.84	6.14	1.00	1.16	.59
8.	12.39	11.35	16.79	5.70	7.18	7.82	1.00	1.14	.75
9.	26.96	17.53	21.42	9.53	11.10	14.97	1.82	1.36	1.5[5]
All Groups	100.00	99.99	99.98	3.33	2.56	2.09	.81	.51	.35

TABLE V

VILLAGE 1 : COMMAND OVER EFFECTIVE LAND BY BASIC LAND-OWNERSHIP GROUPS : 1951-1981

Landownership Groups	% of Effective Land			Effective Land/HH			Effective Land/Capita		
	1951	1972	1981	1951	1972	1981	1951	1972	1981
1.	0	.20	.95	0	.11	.32	0	.02	.08
2.	.87	3.53	2.89	.28	.34	.16	.07	.07	.03
3.	2.27	7.82	8.87	.78	1.31	.98	.29	.28	.18
4.	10.68	17.11	15.00	2.01	2.02	1.86	.60	.39	.30
5.	8.71	12.56	7.18	2.67	3.05	2.45	.70	.55	.30
6.	20.80	16.43	14.48	3.78	3.99	4.23	.87	1.73	.51
7.	13.60	10.01	10.29	5.13	6.27	6.02	1.11	1.25	.58
8.	13.29	12.28	18.04	6.52	7.68	8.21	1.18	1.22	.79
9.	29.78	20.03	22.28	11.25	12.52	15.20	2.15	1.53	1.57
All Groups	100.00	99.98	99.98	3.55	2.53	2.04	.86	.50	.34

preferred to rent out part of their operated land as they found it more profitable to do so. So the share of poorer groups in total operated land was higher in the period 1951-72. And the share of land-rich groups was lower. But the situation has changed significantly in the 1970s as cultivation with hired labour has become more profitable following the inflow of modern inputs like seeds, fertilizer and, most important of all, irrigation pumps in this village since the late 1960s. Consequent upon this there has been some eviction of sharecroppers.

(3) The picture is more or less the same when we compile the distribution of effective land (i.e., the net operated land left after making the necessary rental share adjustments) amongst nine land-owning groups. Table V reveals that, on average, both per capita and per shouschold effective land has declined over time. Compared to the average figures, we notice significant differences between the poorer and the richer landowning groups.

As for the percentage command over effective land by differen. groups, we find wide differences between groups in all the cut-off periods. As with operated land, the poorer groups appeared to have gained some land in the 1950s and the 1960s, but they have been losing their effective control over the land as some of the

rich farmers began to repossess the land and also the rental share deteriorated for the remaining tenants in recent years.

How the command over different catergories of land by different groups of the peasantry varied in village 2 can be seen from Tables VI, VII and VIII.

(i) Table VI shows a pattern of inequality similar to that depicted in the case of owned land in Table IIB, though the concentration is worse in the case of owned cultivable land. Thus while the richest group (group 9) had command over about 48%, 37% and 40% of total owned land in 1951, 1972 and 1981 respectively, the same group commanded 49%, 38% and 41% own cultivable land in those years.

(ii) As for operated land, the situation in village 2 was slightly different from that in village 1. Irrigation and other modern inputs have not yet made sufficient inroads in village 2. A substantial proportion of rich households still rent out part of their land to the poorer and middle peasants. Compared to owned cultivable land, the share of operated land accruing to the richer groups is indeed smaller. The opposite is the case for the poorer peasantry. Immediately after the abolition

TABLE VI

VILLAGE 2 : **COMMAND OVER OWNED CULTIVABLE LAND BY LANDOWNING GROUPS : 1951-1981**

Landowning Groups	% of Total Owned Cultivable Land			Owned Cultivable Land per HH (acres)			Owned Cultivable Land Per Capita (acres)		
	1951	1972	1981	1951	1972	1981	1951	1972	1981
1.	0	0	0	0	0	0	0	0	0
2.	.35	.29	1.64	.32	.27	.22	.09	.07	.05
3.	2.66	3.14	5.11	.90	.68	.99	.24	.17	.17
4.	2.00	11.05	10.08	1.82	1.85	1.63	.45	.48	.32
5.	5.08	10.23	13.33	2.78	2.6	2.78	.77	.64	.51
6.	10.75	14.55	11.20	4.19	4.15	3.63	1.22	.81	.59
7.	13.66	17.20	12.57	5.33	6.13	5.25	1.33	1.06	.75
8.	16.65	5.59	5.35	7.59	7.98	7.83	1.82	1.23	.98
9.	48.84	37.95	40.70	14.84	18.06	19.83	2.02	1.97	1.67
All Groups	**99.95**	**100.00**	**99.98**	**5.36**	**3.52**	**2.41**	**1.24**	**.75**	**.44**

TABLE VII

VILLAGE 2 : **COMMAND OVER OPERATED LAND BY LANDOWNING GROUPS : 1951-1981**

Landowning Groups	% of Total Operated Land			Operated Land Per HH (acres)			Operated Land Per Capita (acres)		
	1951	1972	1981	1951	1972	1981	1951	1972	1981
1.	.82	0	2.26	.66	0	.23	.28	0	.05
2.	.81	.36	1.83	.65	.34	.26	.19	.08	.06
3.	4.22	3.78	5.90	1.28	.80	1.20	.34	.19	.21
4.	2.25	14.52	10.83	1.82	2.35	1.84	.45	.61	.36
5.	5.53	10.86	13.03	2.69	2.72	2.84	.74	.66	.53
6.	12.75	15.09	11.83	4.43	4.16	4.02	1.29	.82	.65
7.	14.21	17.26	11.90	4.94	5.95	5.20	1.23	1.03	.74
8.	16.44	5.28	4.91	6.67	7.28	7.50	1.60	1.12	.94
9.	42.97	32.83	37.48	11.62	15.10	19.11	1.58	1.65	1.61
All Groups	100.00	99.98	99.99	4.77	3.40	2.52	1.10	.73	.45

TABLE VIII

VILLAGE 2 : **COMMAND OVER EFFECTIVE LAND BY LANDOWNING GROUPS : 1951-1981**

Landowning Groups	% of Effective Land			Effective Land Per HH (acres)			Effective Land Per Capita (acres)		
	1951	1972	1981	1951	1972	1981	1951	1972	1981
1.	.39	0	1.60	.33	0	.16	.14	0	.04
2.	.57	.31	1.75	.49	.29	.25	.15	.07	.05
3.	3.40	3.47	5.80	1.09	.75	1.17	.29	.18	.20
4.	2.12	12.90	10.72	1.82	2.15	1.80	.45	.56	.35
5.	5.12	10.38	12.90	2.64	2.67	2.78	.73	.65	.52
6.	11.99	14.94	11.68	4.42	4.23	3.92	1.29	.83	.64
7.	13.50	17.22	12.09	4.98	6.09	5.22	1.24	1.06	.75
8.	16.66	5.44	4.96	7.16	7.71	7.50	1.72	1.18	.94
9.	46.25	35.32	38.49	13.26	16.67	19.41	1.80	1.82	1.64
All Groups	100.00	99.98	99.99	5.06	3.49	2.50	1.17	.74	.45

of the *Zamindari* system, the richer groups, mostly *jotedars,* repossessed their rented-out land from poor tenants and hence we notice a very high share of operated land in the richer groups in the early fifties. But as the dust finally settled and the land reform Act of 1950 was effectively neutralised, they once again began to rent out land to poorer peasants. So their share in operated land dropped in the late 1950s and early 1960s. But in the 1970s, they appear to have increased their share somewhat, which indicates repossession of some of their rented out land from tenants. There appears to be a slight increase in the share of operated land in the poorer groups. But compared to the expansion in the number of households in this section of the peasantry (say groups 1 and 2) the increase in their share in operated land is negligible. This is reflected in the declining amount of per household and per capita operated land in the poorer groups.

(iii) We find an equally differential picture with respect of command over effective land. As can be seen in Table VIII, it is somewhat less skewed than owned cultivable land distribution and more skewed than operated land distribution. In any case, village 2, under the increasing pressure of population, and being deprived of the modern inputs of production, has been experiencing increasing 'immiserization' in the landholding sizes both in average and group terms. But in relative terms, the inequality situation between the poorer and richer groups in fact, worsened over the three decades. However, the degree of difference has not been as pronounced as in village 1.

One may, however, argue that using landowning groups alone as one's basic reference groups precludes one from saying anything conclusively about the existence of inequalities. The tenancy system operating in Bangladesh over a long period, one may argue, must have had some moderating impact on inequality. To test this hypothesis, we have taken each of the remaining categories of land (i.e., owned cultivable, operated and effective) as the basic reference groups and then compiled individual distributions for each category. While doing so, we note some changes in distributions, especially with respect to operated land. But the changes were not so significant as to negate the broad trends of inequalities which we have observed in earlier tables. Tables IX, X and XI summarize the findings in village 1.

The preceding tables also reveal the differences emerging when we change the basic reference land groups.

(i) When we distribute owned cultivable land among the new reference groups (see Table IX) we find the distribution as unequal as before. Taking groups 1 and 2 together, we find that although their proportion in the total households increased quite dramatically (from about 15% in 1951 to 31% in 1972 and 41% in 1981), their share in the total owned cultivable land did not increase at the same rate. In fact, in the later decade, their share declined. But for the richest two groups, while

TABLE IX

VILLAGE 1 : **DISTRIBUTION OF OWNED CULTIVABLE LAND : 1951-1981**

Owned Cultivable Land Groups	% of Households			% of Owned Cultivable Land		
	1951	1972	1981	1951	1972	1981
1.	10.87	10.98	6.00	0	0	0
2.	4.35	20.81	35.00	.33	2.61	1.82
3.	15.21	19.07	18.50	4.39	8.74	7.78
4.	20.29	19.07	16.50	11.42	16.41	15.16
5.	10.87	9.83	6.00	9.49	12.03	8.08
6.	18.11	8.09	7.00	21.94	13.41	14.36
7.	9.42	4.62	3.50	16.80	11.87	10.49
8.	4.35	3.47	4.50	11.10	11.69	19.35
9.	6.52	4.05	3.00	24.53	23.23	22.95
All Groups	99.99	99.99	100.00	100.00	99.99	99.99

TABLE X

VILLAGE 1 : **DISTRIBUTION OF OPERATED LAND : 1951-1981**

Operated Landgroups	% of Households			% of Operated Land		
	1951	1972	1981	1951	1972	1981
1.	10.87	10.40	25.50	0	0	0
2.	3.62	12.72	15.00	.49	1.44	1.94
3.	13.04	18.50	20.00	4.21	7.55	10.11
4.	20.29	22.54	14.00	12.53	18.00	13.12
5.	13.77	11.56	8.00	12.45	13.48	11.65
6.	19.56	11.56	6.00	24.74	18.70	11.94
7.	10.87	6.93	5.00	20.02	16.87	14.74
8.	3.62	2.89	3.50	9.50	9.97	15.08
9.	4.35	2.89	3.00	16.04	13.99	21.42
All Groups	99.99	99.99	100.00	99.98	100.00	100.00

TABLE XI

VILLAGE 1 : **THE DISTRIBUTION OF EFFECTIVE LAND : 1951-1981**

Effective Landgroups	% of Households			% of Effective Land		
	1951	1972	1981	1951	1972	1981
1.	8.69	8.67	23.00	0	0	0
2.	5.07	16.76	17.00	.49	1.87	2.41
3.	12.32	19.07	21.50	3.23	7.92	10.74
4.	20.29	21.38	17.50	11.81	16.96	17.54
5.	15.22	12.14	4.00	12.81	14.42	6.07
6.	15.22	8.67	6.00	18.29	13.92	12.22
7.	13.76	6.94	4.50	23.68	16.97	13.38
8.	2.90	2.31	3.50	7.00	7.59	15.35
9.	6.52	4.05	3.00	23.17	20.33	22.28
All Groups	99.99	99.99	100.00	99.98	99.98	99.99

their proportion in the total husehold remained more or less at the same level (around 7%) their share in the total owned cultivable land increased from about 35% in 1951 to 42% in 1981. The seventies saw the higher rate of increase in these two groups than in 1950s and the 1960s.

(i.) The percentage of the landless households rose quite sharply when we compiled the distribution using operated land groups as the reference groups. The percentage change accelerated in the 1970s.

By contrast, the proportion of the richest two groups in the total households did not vary significantly (around 6%). But their command over operated land increased quite significantly (from 25% in 1951 to 36% in 1981). Although there were 138, 173 and 200 households in 1951, 1972 and 1981 respectively, there were actually 123, 155 and 149 farms[4] in those years. Thus, although the number of farms increased in the 1950s and 1960s, the trend has been reversed in the 1970s. The number of farms, in fact, declined even though the total number of households increased in the 1970s. This means that most of the households with a small amount of land have been renting out that land and joining the labour market as wage labourers. Another reason for the squeeze in the number of farms is the resumption of rented out land by the rich households in the 1970s.

[4]Households who had $\geq$ 0 acre of operated land.

(iii) The inequality situation was even worse with respect to the distribution of effective land, than was the case with operated land.

Using effective land groups as the reference group, we see in Table XI that the effective control over land by the land-rich groups improved in the 1970s compared to the earlier two decades. There was also a slight improvement in the share of effective land by the land poor groups, but the proportion of the households in these groups increased at a higher pace to offset the gain. In fact, the distribution of effective land in village 1 is, without doubt, unequal.

Using similar reference groups, we present three separate distributions of land in village 2 in order to capture the nature of inequalities there too. Tables XII, XIII and XIV represent three distributions of land compiled for three cut-off periods of 1951, 1972 and 1981.

We get a similar picture of inequalities in village 2 from Tables XII, XIII and XIV.

(i) As is indicated by Table XII, although the proportion of households in the poorest stratum[5] (including groups 1, 2 and 3) increased considerably (from about

TABLE XII

VILLAGE 2 : **DISTRIBUTION OF OWNED CULTIVABLE LAND : 1951-1981**

Owned Cultivable Land Groups	% of Households			% of Cultivable Land		
	1951	1972	1981	1951	1972	1981
1.	5.88	13.58	28.92	0	0	0
2.	5.88	6.17	12.40	.35	.27	1.64
3.	17.65	18.52	17.35	2.66	4.83	7.48
4.	5.88	20.99	13.22	2.00	12.14	11.75
5.	9.80	9.87	12.40	5.08	8.41	14.79
6.	13.72	11.11	6.61	10.74	13.59	12.00
7.	11.76	9.87	3.30	13.66	17.20	8.55
8.	11.76	2.47	.82	16.65	5.59	3.08
9.	17.65	7.40	4.96	48.84	37.95	40.70
All Groups	**99.98**	**99.98**	**99.98**	**99.98**	**99.98**	**99.99**

[5]Note that we have included group 3 in the poorest group as the productivity of land in Village 2 is lower than that in Village 1. This calls for group re-adjustments.

TABLE XIII

VILLAGE 2 : **DISTRIBUTION OF OPERATED LAND : 1951-1981**

Operated Land Groups	% of Households			% of Operated Land		
	1951	1972	1981	1951	1972	1981
1.	7.84	13.58	28.10	0	0	0
2.	3.92	7.40	12.40	.59	.60	1.48
3.	17.65	11.11	13.22	5.00	2.71	5.17
4.	13.72	23.46	14.06	7.74	14.50	11.94
5.	9.80	12.34	13.22	8.88	11.06	15.16
6.	3.92	11.11	8.26	5.33	13.82	14.88
7.	21.57	12.34	4.96	26.03	21.49	10.54
8.	9.80	2.47	1.65	17.26	5.86	6.31
9.	11.76	6.17	4.13	29.16	29.94	34.52
All Groups	99.98	99.98	99.99	99.99	99.98	100.00

TABLE XIV

VILLAGE 2 : **DISTRIBUTION OF EFFECTIVE LAND : 1951-1981**

Effective Land Groups	% of Households			% of effective Land		
	1951	1972	1981	1951	1972	1981
1.	3.92	13.58	23.14	0	0	0
2.	5.88	6.17	14.87	.35	.42	1.75
3.	17.65	13.58	18.18	2.66	3.09	7.21
4.	11.76	22.22	14.05	2.00	12.87	11.41
5.	5.88	11.11	12.40	5.08	9.36	17.78
6.	7.84	12.34	6.61	10.74	14.43	11.90
7.	21.57	12.34	4.96	13.66	21.62	11.78
8.	7.84	1.24	1.65	16.65	2.88	6.05
9.	17.65	7.40	4.13	48.84	35.32	35.08
All Groups	99.99	99.98	99.99	99.98	99.99	99.97

29% in 1951 to about 38% in 1972 and about 59% in 1981), the corresponding share of owned cultivable land were only 3%, 5%, and 9% for this section of the peasantry. Two sets of figures do not really correspond in proportional terms. So the share of owned cultivable land per household and per capita must have dropped dramatically in recent years. But for the richest group (owning more than 10.01 acres of cultivable land) while the proportion in total households declined so abruptly (from 17.65% in 1951 to 7.40% in 1972 and to 4.96% in 1981), the corresponding shares in the total owned cultivable land did not vary that much (from 48.84% in 1951 to 37.95% in 1972 and to 40.70% in 1981). That means the average per household figures must have been much higher during the later period (i.e., 1970s). The inequality situation has thus further worsened.

(ii) We have used operated land groups as the reference groups in Table XIII for village 2. The distribution, though slightly more equitable than in the others, is skewed enough to cause concern. Although the proportion of households increased significantly in the poorest stratum (from 29% to 54% in between 1951 and 1981), their share in the operated land remained almost the same (5.99% in 1951 compared to 6.65% in 1981).

By contrast, in the richest stratum whereas the proportion of households actually dropped from 11.76% in 1951 to only 4.13% in 1981, their share in the total operated land improved (from 29.16% in 1951 to 34.52% in 1981). This suggests that the richer households have been resuming some of their erstwhile rented out land from tenants. This is also supported by the fact that the number of farms has not been increasing at the same rate in recent years as earlier. There were 47 farms in 1951. The number increased to 70 in 1972 and to 87 in 1981.

So our findings indicate quite clearly that the inequality situation has been worsening over time and the concentration of land in the hands of a few households has been gaining momentum. We now turn to an estimation of the extent of that concentration.

III. CONCENTRATION OF LAND

We have pursued two empirical exercises to est mate the extent of concentration of land :

(1) We calculated the concentration ratios (more precisely Gini co-efficients, see Sen, 1973 : 31) for 1951, 1972 and 1981 using the following formula.

$$G = 1 + 1/_n - (2/_n 2M)(y_1 + 2y_2 + \ldots n\ y_n).$$

Where n = number of observations (here number of household)

$y_1, y_2, \ldots y_n$ = the characteristics (i.e., landholding size),

$$\text{where } y_1 \geq y_2 \geq y_3 \ldots \geq y_n$$

M = the mean of the characteristics (i.e., average landholding size).

(2) We computed the relative shares in different categories of land of two polar groups of the households :

(a) the bottom 60% of the households and

(b) the top 10% of the households.

Groups (a) and (b) roughly correspond to the poor and prosperous peasantry. We then compared these relative shares graphically.

Using data on land for 1951, 1972 and 1981 we have calculated concentration ratios for both the villages. They are given in Table XV.

Table XV reveals that concentration has been increasing consistently since the early 1950s and that the rate of increase has been greater in the 1970s. It also reveals that the extent of concentration was greater in Village 2—a typical feature of a North Bengal village.

(i) In Village 1, the concentration ratio for owned land increased by an amount of .07 between 1951 and 1972 and by an amount of .08 between 1972 and 1981. The annnual percentage changes for those two periods were +.65 and +1.53 respectively.

In Village 2, the corresponding increases for owned land were .07 and .14. The annual % changes were +.68 and +2.77.

(ii) The increase in the concentration of operated land was relatively small in the 1950s and 1960s in Village 1/(and not in Village 2). But the change has been quite significant in the 1970s in both the villages. This confirms our earlier suggestion that the rich peasantry was repossessing some of their rented out land from the poor tenants to operate under their own superivision with the help of hired labourers

(ii) The trend in the concentration of effective land also supports the above hypothesis. In fact, in Villlage 1, the concentration has been higher in both

TABLE XV

CONCENTRATION RATIOS : 1951-1981

Land Categories	Concentration Ratios					
	VILLAGE 1			VILLAGE 2		
	1951	1972	1981	1951	1972	1981
1. Owned Land	.51	.58	.66	.49	.56	.70
2. Owned cultivable land	.50	.59	.68	.48	.57	.71
3. Operated land	.47	.53	.68	.43	.55	.68
4. Effective land	.44	.54	.68	.46	.58	.68

	CHANGES IN CONCENTRATION RATIOS			
	VILLAGE 1		VILLAGE 2	
	1951-1972	1972-1981	1951-1972	1972-1981
1. Owned land	.07	.08	.07	.14
2. Owned cultivable land	.09	.09	.09	.14
3. Operated land	.06	.05	.12	.13
4. Effective land	.10	.14	.12	.10

	ANNUAL % CHANGE IN CONCENTRATION RATIOS			
	VILLAGE 1		VILLAGE 2	
	1951-1972	1972-1981	1951-1972	1972-1981
1. Owned land	+.65	+1.53	+.68	+2.77
2. Owned cultivable land	+.85	+1.69	+.89	+2.34
3. Operated land	+.60	+1.04	+1.32	+2.62
4. Effective land	+1.08	+2.80	+1.24	+1.91

the periods compared to the other categories of land. Concentration of effective land in Village 2, is also quite high but not the highest. This suggests that some sort of land adjustments do still take place in Village 2.

The pattern of concentration which we have noted can also be demonstrated with the help of the Lorenz Curve. Figures 1 and 2 represent two Lorenz curves for Villages 1 and 2. We have drawn these Lorenz Curves only for owned land distribution of the three reference periods—1951, 1972 and 1981. Here households have been taken as proxy for population and the land as proxy for income.

As we can see from Figures 1 and 2 the Lorenz curve has been moving outword consistently overtime in both villages.

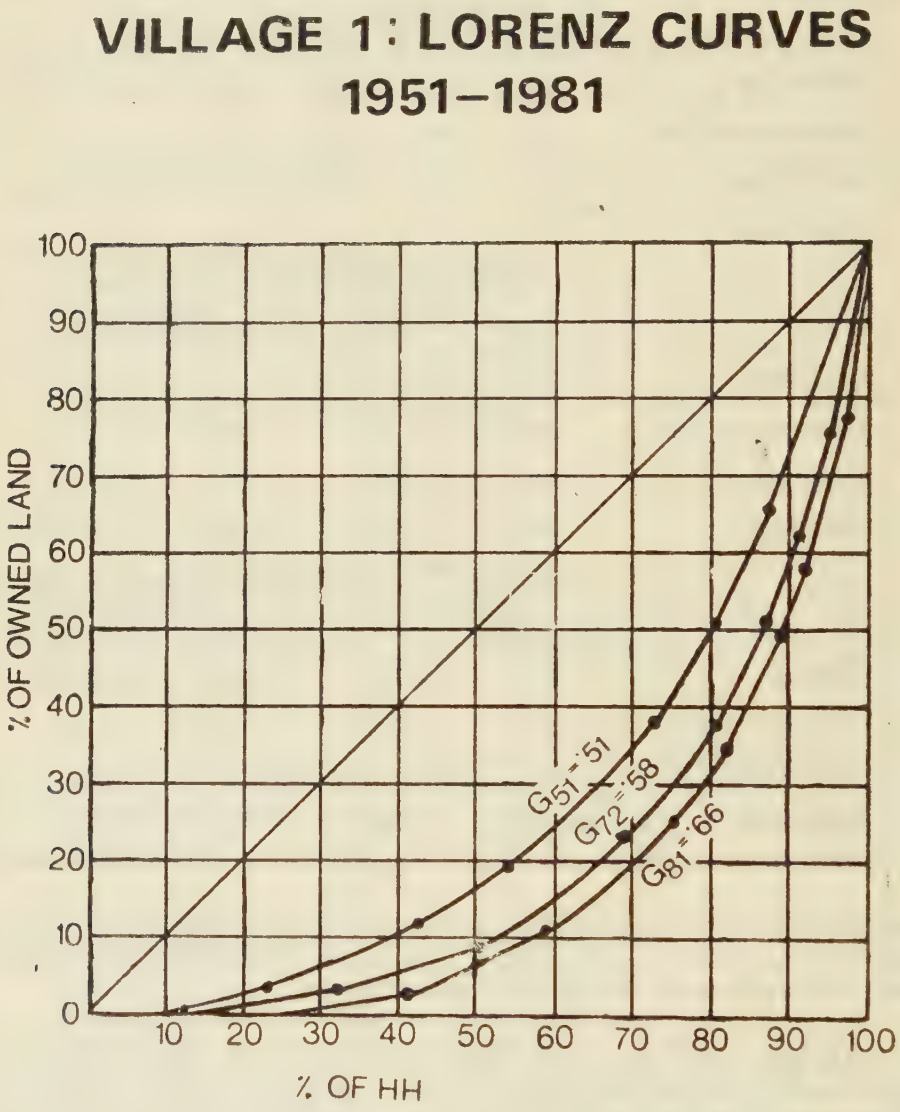

Figure 1

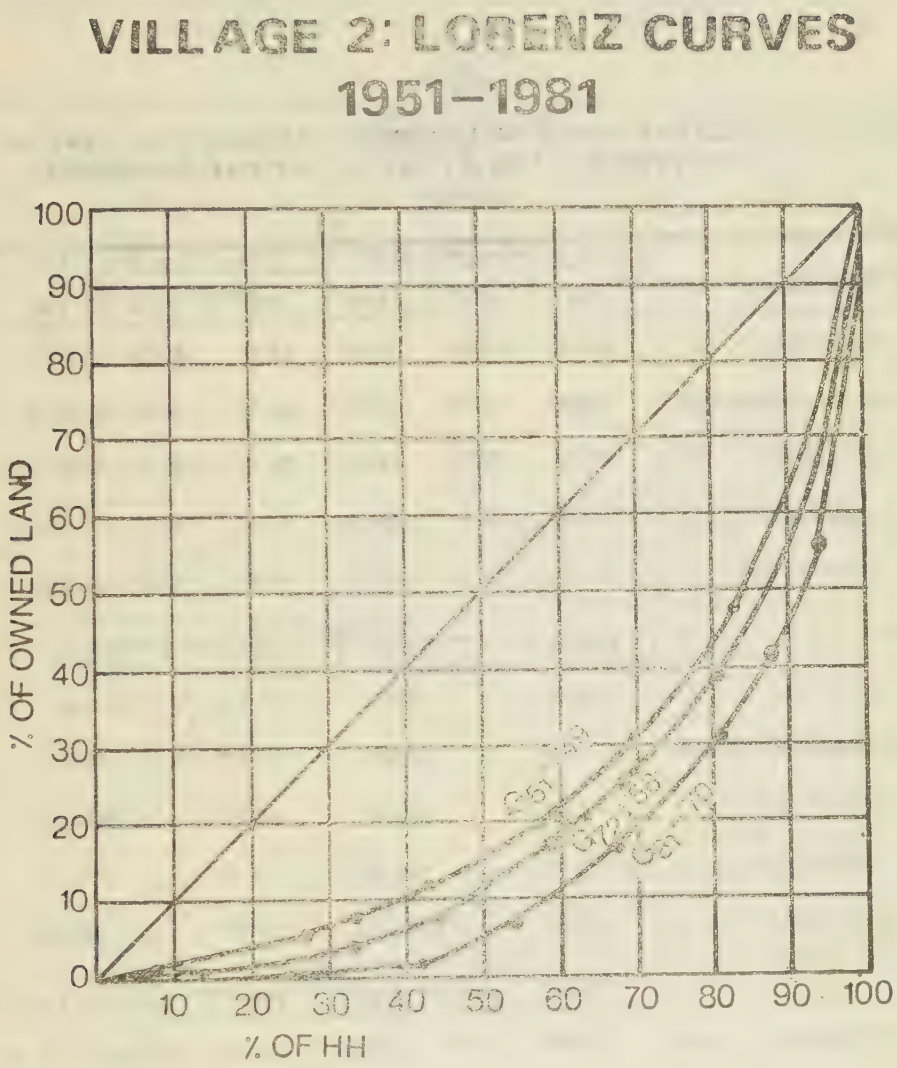

Figure 2

That inequality has been increasing can also be confirmed by computing the relative shares of land (all categories) of two polar groups of the households (i.e., (a) the bottom 60% and (b) the top 10%).

Table XVI shows the changes, in the relative shares of those two polar groups for Village 1. Table XVII shows the same thing for Village 2.

TABLE XVI

VILLAGE 1 : **RELATIVE SHARES OF DIFFERENT CATEGORIES OF LAND BY (A) BOTTOM 60% AND (B) TOP 10% OF THE HOUSEHOLDS 1951-1981**

Land Categories	Share of Bottom 60% of HH			Share of Top 10% of HH		
	1951	1972	1981	1951	1972	1981
1. Owned land	24.35	18.81	12.00	34.81	41.25	47.85
2. Owned cultivable land	24.48	18.34	9.93	33.91	41.03	50.28
3. Operated land	29.57	25.54	14.71	28.37	32.87	45.70
4. Effective land	27.93	22.44	13.08	31.32	36.92	47.99
5. Homestead land	23.31	23.79	34.51	41.80	43.87	21.42
	Percentage Changes					
	1951-72		1972-81	1951-72		1972-81
1. Owned land	−5.54		−6.18	+6.44		+6.81
2. Owned cultivable land	−6.14		−8.41	+7.12		+9.25
3. Operated land	−4.03		−10.83	+4.50		+12.83
4. Effective land	−8.88		−9.30	+5.60		+11.07
5. Homestead land	+0.48		+10.72	+2.04		−22.42
	Index					
	1951	1972	1981	1951	1972	1981
1. Owned land	100.00	77.31	49.32	100.00	118.50	137.46
2. Owned cultivable land	100.00	74.91	40.56	100.00	120.99	148.27
3. Operated land	100.00	86.37	49.74	100.00	115.86	161.08
4. Effective land	100.00	80.34	46.83	100.00	117.84	153.22
5. Homestead land	100.00	102.05	148.04	100.00	104.95	51.24

TABLE XVII

VILLAGE 2 : **RELATIVE SHARES OF DIFFERENT CATEGORIES OF LAND BY (A) BOTTOM 60% AND (B) TOP 10% OF THE HOUSEHOLDS 1951-1981**

Land Categories	Share of Bottom 60% (In Percentages)			Share of Top 10% (In Percentages)		
	1951	1972	1981	1951	1972	1981
1. Owned land	24.53	19.32	10.90	29.69	42.34	53.85
2. Owned cultivable land	24.77	18.29	10.57	29.31	43.54	54.03
3. Operated land	31.20	23.28	13.70	21.89	38.11	49.89
4. Effective land	27.95	20.86	13.03	25.46	40.76	51.04
5. Homestead land	22.17	31.59	13.21	33.47	26.20	52.60

	Pecrcentage Changes			
	1951-72	1972-81	1951-72	1972-81
1. Owned land	-5.21	-8.42	+12.65	+11.51
2. Owned cultivable land	-6.48	-7.7[2]	+14.23	+10.49
3. Operated land	-7.92	-9.58	+16.22	+11.78
4. Effective land	-7.09	-7.83	+15.30	+10.20
5. Homestead land	9.42	-18.38	-7.27	+26.40

	Index					
	1951	1972	1981	1951	1972	1981
1. Owned land	100.00	78.76	44.43	100.00	142.60	181.37
2. Owned Cultivable land	100.00	73.83	42.67	100.00	148.55	184.34
3. Operated land	100.00	74.61	43.91	100.00	174.09	227.91
4. Effective land	100.00	74.63	46.62	100.00	160.09	200.47
5. Homestead land	100.00	142.49	59.58	100.00	78.28	157.15

Tables XVI and XVII show the secular decline in the share of the bottom 60% of households and dramatic rise in the shares of the top 10% of the households in both the villages.

Thus :

(i) While the bottom 60% of the households of Village 1 owned 24.35% of total land in 1951, their share has fallen to only 12.00% by 1981. Similarly in Village 2, the bottom 60% of households owned 24.53% of land in 1951 and the share has fallen to only 10.90% in 1981. The same thing is true for other categories of land, except in the case of homestead land. The rate of decline has been sharper in the 1970s. Within a short span of thirty years, the share of the bottom section of the peasantry was reduced to half of what they had initially. The slight increase in the share of the homestead land by the poorer section may be due to the sheer increase in the number of households in this group. Most households would sell off their homestead land only at the very last moment. It is their last resort. Hence, as more households came down to the rank of the bottom 60% of the households, their share in the total homestead land also increased.

(ii) At the other end of the spectrum, the top 10% of households have been gaining land consistently and the pace of the enlargement of their holdings has been greater in the 1970s in both the villages.

In Village 1, while the top 10% of households owned 34.81% of the total land in 1951, the share increased to 47.85% in 1981. In Villge 2, the change has been even more spectacular. The top 10% owned 29.69% of total land in 1951, and their share has risen to 53.83% in 1981.

(iii) But the greatest change can be noticed in the case of operated land. In both the villages, the richer section of the peasantry has been enlarging its share of operated holdings over time. This section operated 31.32% in 1951 in Village 1. It increased to 47.99% in 1981. Again in Village 2, the corresponding shares were 25.46% and 51.04%.

It has been argued that richer peasants in North Bengal (in the region in which our Village 2 lies) have been keen to rent out most of their land to tenants while they themselves would do very little cultivation as supervisory farmers (see Wood 1978 : 5). This was, no doubt, true in the 1950s and earlier (as testified by Mukherjee 1957). But the situation has began to change in the late 1960s as the drive for modernisation increased and the pressure on land also grew with the growth of family members.

The glaring contrast between the relative shares of two polar groups of the peasantry can be better demonstrated with the help of graphs. Figures 3 and 4 project the relative shares of these two groups in the total owned and operated land respectively. Figures 5 and 6 show the same for Village 2. The shaded part in the figures shows how fast the differences between the shares of top and bottom sections of the peasantry have been widening over time. The bulging shape on the right illustrates the greater inequality in recent years.

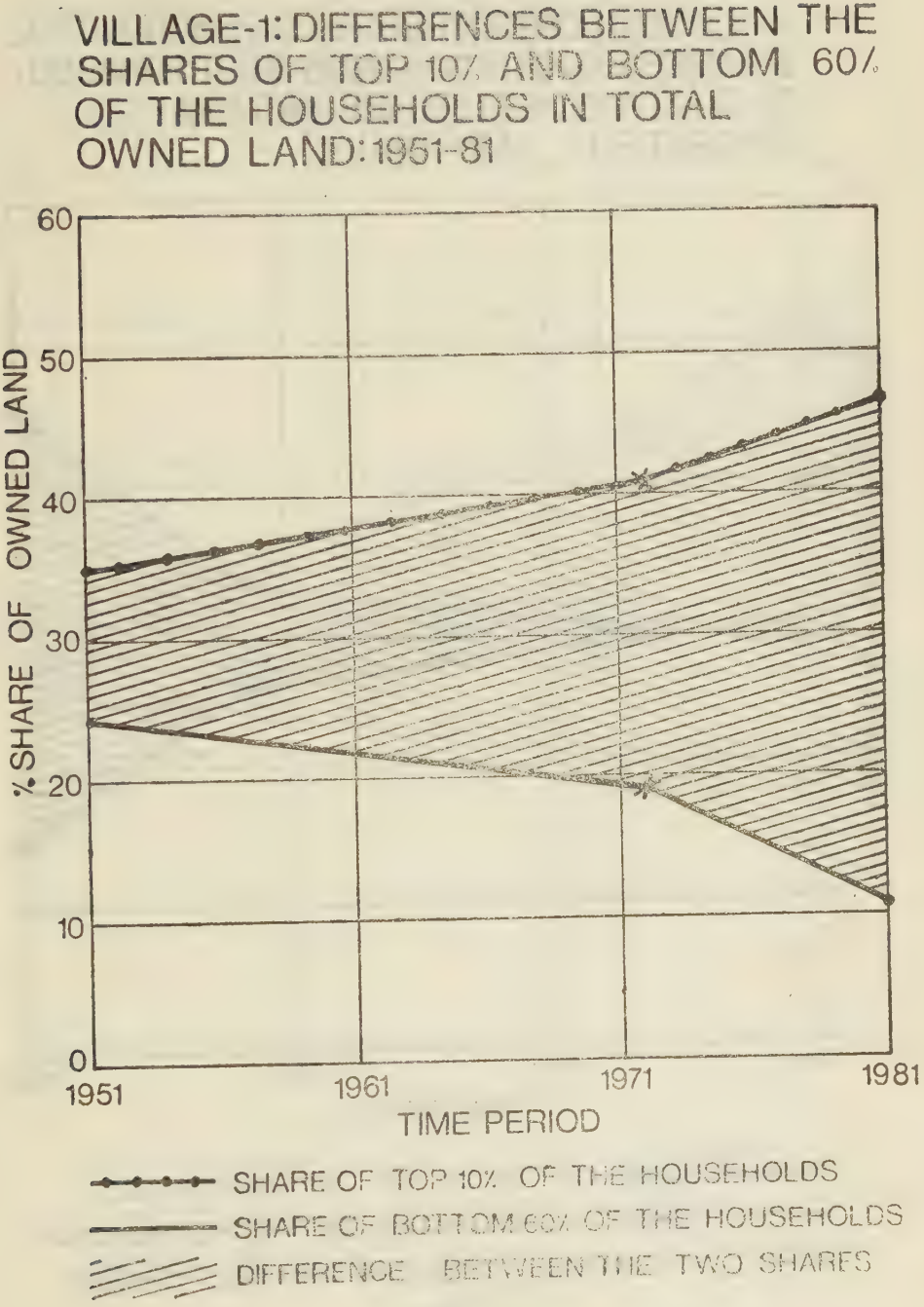
VILLAGE-1: DIFFERENCES BETWEEN THE SHARES OF TOP 10% AND BOTTOM 60% OF THE HOUSEHOLDS IN TOTAL OWNED LAND: 1951-81
% SHARE OF OWNED LAND
60
50
40
30
20
10
0
1951
1961
1971
1981
TIME PERIOD
SHARE OF TOP 10% OF THE HOUSEHOLDS
SHARE OF BOTTOM 60% OF THE HOUSEHOLDS
DIFFERENCE BETWEEN THE TWO SHARES

Figure 3

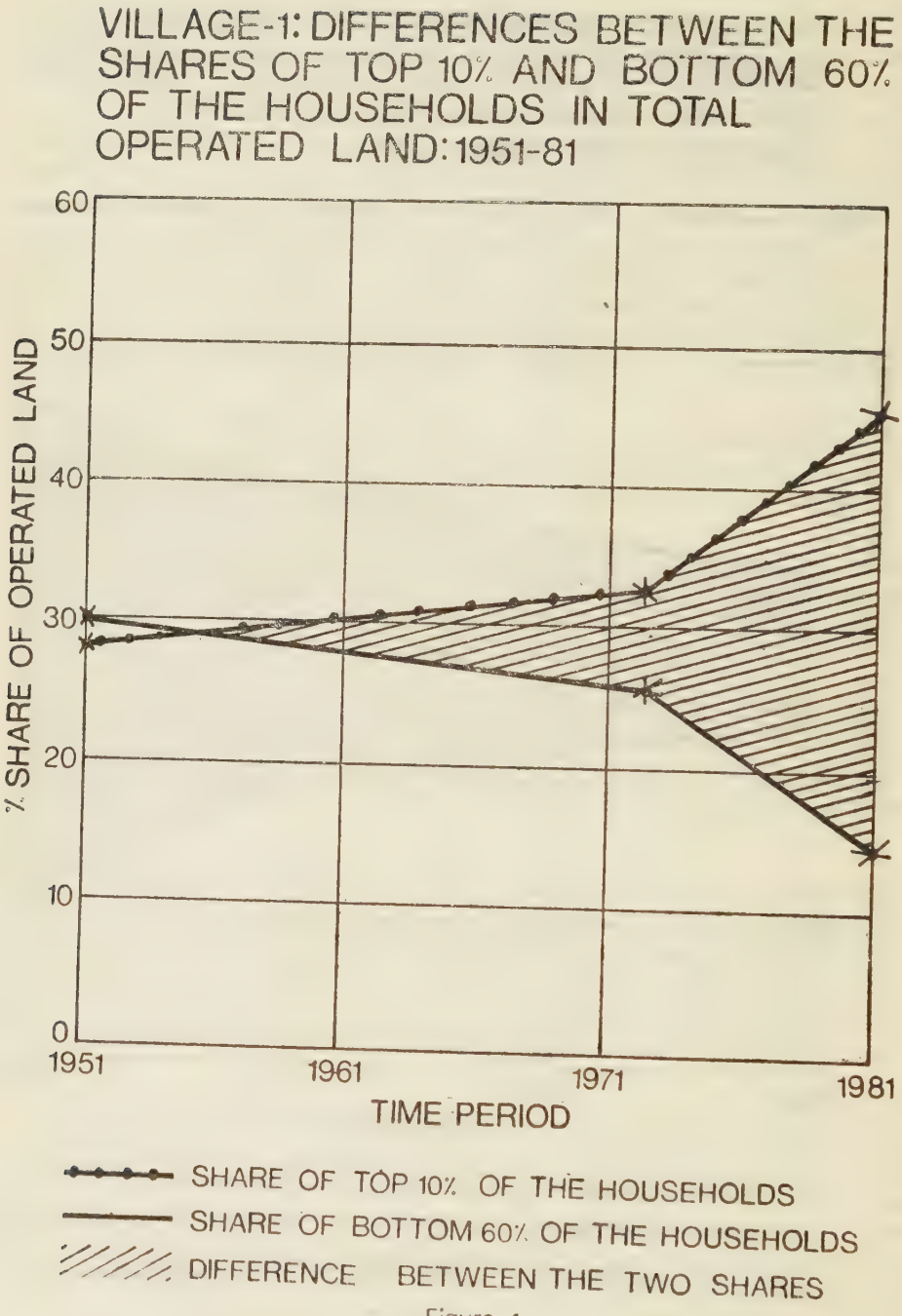
VILLAGE-1: DIFFERENCES BETWEEN THE SHARES OF TOP 10% AND BOTTOM 60% OF THE HOUSEHOLDS IN TOTAL OPERATED LAND: 1951-81
% SHARE OF OPERATED LAND
60
50
40
30
20
10
0
1951
1961
1971
1981
TIME PERIOD
SHARE OF TOP 10% OF THE HOUSEHOLDS
SHARE OF BOTTOM 60% OF THE HOUSEHOLDS
DIFFERENCE BETWEEN THE TWO SHARES

Figure 4

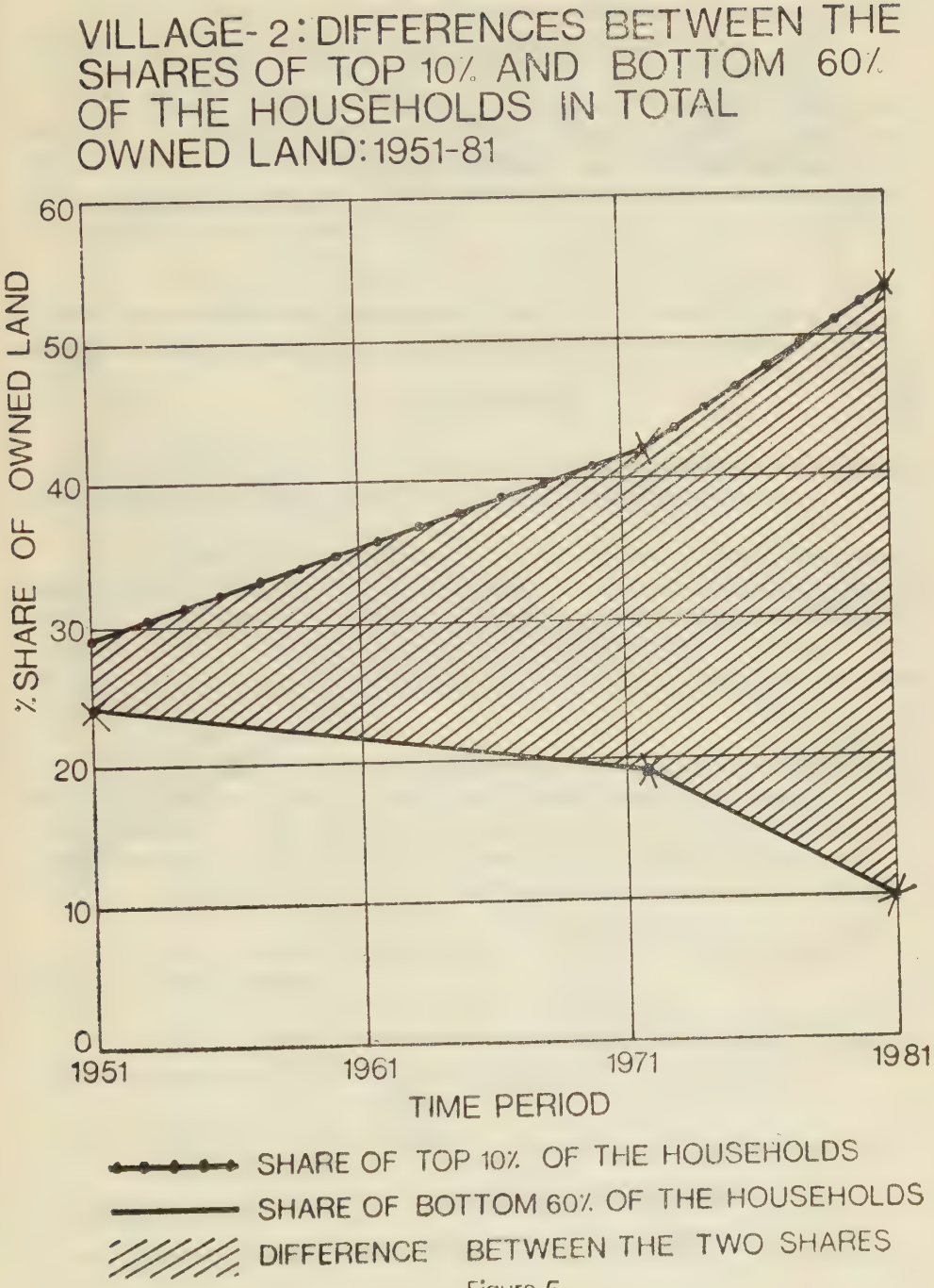
VILLAGE-2: DIFFERENCES BETWEEN THE SHARES OF TOP 10% AND BOTTOM 60% OF THE HOUSEHOLDS IN TOTAL OWNED LAND: 1951-81
% SHARE OF OWNED LAND
60
50
40
30
20
10
0
1951
1961
1971
1981
TIME PERIOD
SHARE OF TOP 10% OF THE HOUSEHOLDS
SHARE OF BOTTOM 60% OF THE HOUSEHOLDS
DIFFERENCE BETWEEN THE TWO SHARES

Figure 5

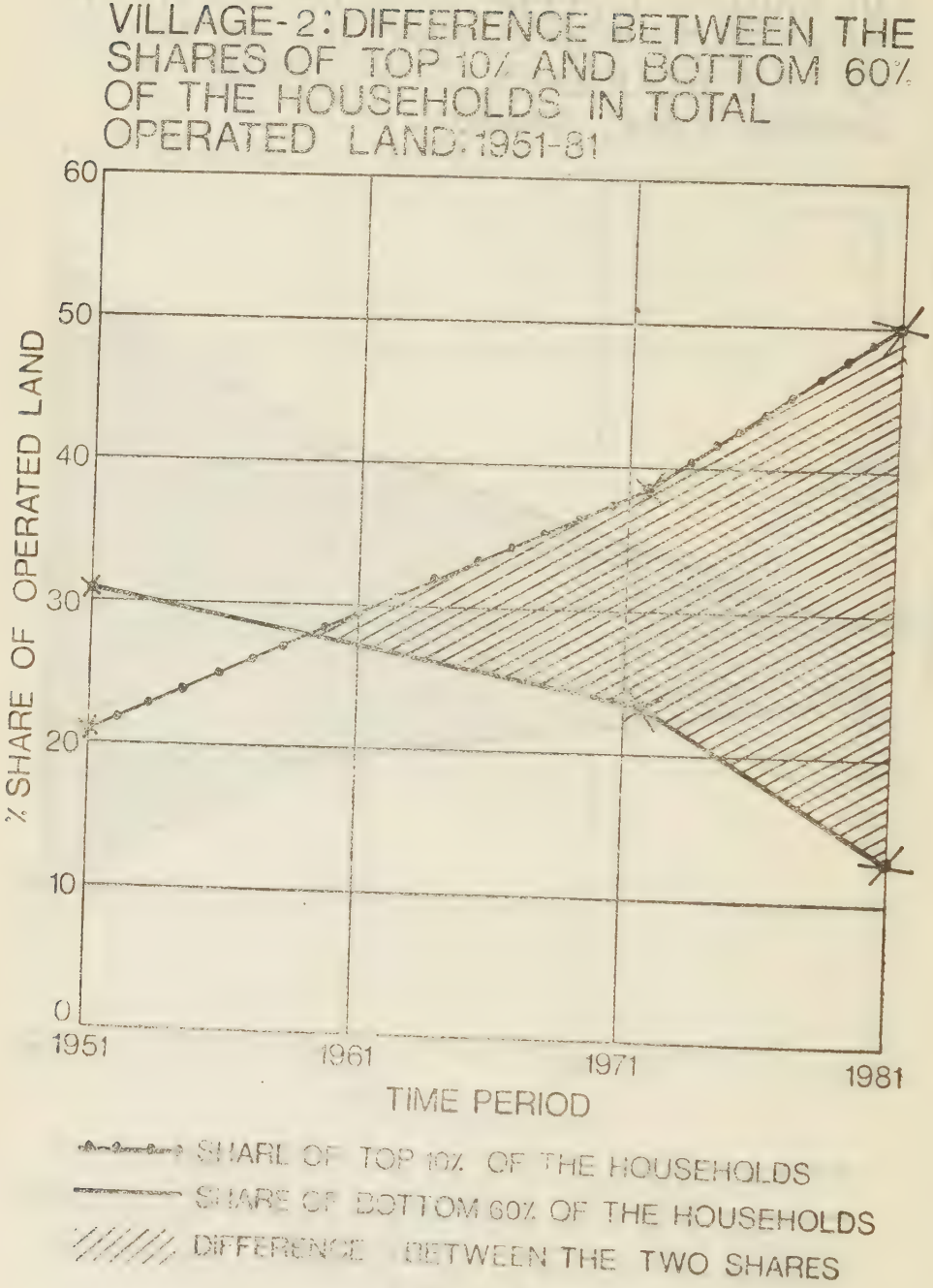
VILLAGE-2: DIFFERENCE BETWEEN THE SHARES OF TOP 10% AND BOTTOM 60% OF THE HOUSEHOLDS IN TOTAL OPERATED LAND: 1951-81
% SHARE OF OPERATED LAND
60
50
40
30
20
10
0
1951
1961
1971
1981
TIME PERIOD
SHARE OF TOP 10% OF THE HOUSEHOLDS
SHARE OF BOTTOM 60% OF THE HOUSEHOLDS
DIFFERENCE BETWEEN THE TWO SHARES

Figure 6

As can be seen in the figures, the inequality situation has worsened in the last three decades and it is more unequal for the operated land.

The shares of operated land for two groups reached a breakeven point in the early 1950s in Village 1 and in the late 1950s in Village 2. And after that, the gap began to widen. In the 1970s, the gap became indeed very wide, confirming our suggestion that the richer households were enlarging the share in the operated land at the cost of the poorer peasantry.

So both the tests in turn (Gini Co-efficients and Relative Shares) lend support to our hypothesis that the concentration of land (all cagetories) has been on the increase and that the speed of that has been certainly greater in the 1970s.

IV. CONCLUSION

The concentration of land in the hands of a few has increased in both villages. Simultaneously, we observed a fast increase in the ranks of the landless :

(i) Households owning less than half an acre of land (including the landless ones) comprised about 14% of total households in Village 1 and 12% in Village 2 in 1951. They increased to 41% in both villages in 1981. They owned .38% of total land in 1951 and the figure rose to 3.06% in 1981 in the case of Village 1. The corresponding figures for Village 2 were .37% and 1.90%. Most of this was again homestead land.

(ii) Rich househods owning more than 7.50 acres of land controlled most of the land, owned and operated. In Village 1, these households comprised 16% of total households in 1951 and owned 47% of total owned. While the proportion of households shrank to 7.5% in 1981, they still owned 40% of total land. In Village 2, we observed a similar concentration.

(iii) Gini-co-efficients calculated from our data also indicated growing concentration in both villages.

(iv) Middle groups of the peasantry were observed to be under tremendous economic preassure and some of them have fallen down the social ladder.

GLOSSARY OF LOCAL TERMS :

Jotedar : Stratum next to landlords and quasi-landlords

Malik : Landowner

Raiyat : Tenant

Taluqdar : Quasi-landlord

Zamindar : Landlord created by *Permanent Settlement* of 1793.

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Factor Substitutability in the Manufacturing Industries of Bangladesh : An Application of the Translog Cost Model

by

Ali Ahmed Rushdi*

The translog cost function estimation approach has been used in this paper, to estimate important industrial policy parameters. The translog approach differs from the more frequently used techniques viz., the generalized Cobb-Dauglas production function (C-D) approach and the Constant Elasticity of Substitution (CES or ACMS) approach, in that restrictive assumptions about the elasticity of substitution between factors do not have to be made. The translog approach also has the additional advantage of providing cost shares for each factor, pair-wise elasticity of substitution, and own and cross price elasticities for the inputs. Thus, a whole range of policy parameters can be simultaneously estimated.

While estimates of elasticity of substitution between capital and labour, and capital and materials are not significantly different from one, the parameter estimate is significantly below unity for substitution between labour and materials. The cross price elasticities show that the three inputs capital, labour and materials are complements in production. The own price elasticities have the appropriate signs and are all significantly below one. As expected the cost share of raw materials is the largest (78.9%) followed by labour's share (14.6%) and capital's share (6.5%). Alternative hypotheses regarding scale economies have also been tested. Data from the manufacturing sector of Bangladesh for the period 1969/70 to 1978/79 have been used.

I. INTRODUCTION

Of late, it has come to focus that the traditional way of measuring substitutability between labour and capital in manufacturing industries, ignoring the third factor—materials (or a fourth factor energy), may not be theoretically justified. The third factor may be excluded only when it can be assumed that elasticity of substitution between materials (M) and capital (C) on the one hand, and between materials

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and labour (L) on the other, are the same. Barnett and Morse (1963), Humphrey and Moroney (1977), and Magnus (1979) among others consider this as highly implausible, and Christensen and Greene (1976) consider this as a severe restriction on Allen partial elasticity of substitution. The Arrow, Chennery, Minhas and Solow (ACMS) model (1961) provides a scope for evaluating the possibility of substitution between factors but presupposes constant return to scale. In an attempt to examine factor substitution between any pair of factors Nerlove (1963) considered ACMS superior to the generalized Cobb-Douglas model (GCD), but he obtained the same elasticity of substitution between labour and capital and between fuel and capital which according to him," hardly seems reasonable" (Nerlove 1963, p. 174).

It seems that the translog cost function pioneered by Christensen, Jorgenson and Lau (1973) provides a superior model to either the ACMS which presupposes constant return to scale or the GCD which presupposes unitary elasticity of substitution between two factors. The translog function requires neither of them. However, the hypotheses as regards constant return to scale and unitary elasticity of substitution can be tested imposing necessary restrictions in the translog model. We intend to use this model in the present study to estimate the substitutability between capital, labour and materials in the manufacturing industries of Bangladesh. The pioneering attempt in this field in the case of Bangladesh was made by Rahman (1973) but he used the two factor models of ACMS(1961) and Proush(1963) in neither of which the relationship between materials and capital and that between materials and labour is discussed. Like previous studies such as Weiser (1968) and Baldwin (1971), it is implicitly assumed that materials are used in some fixed proportion with capital. However, studies made by Alder (1961), Meier (1961), Barnett and Morse (1963) give the opposite view as regards the substitution possibility between capital and materials. The present paper is intended to examine the possible substitution between any two factors in manufacturing industries of Bangladesh.

The model used in the present paper is discussed in the following section. This will be followed by the presentation of results in section two. The nature and the source of the data used are to be found in Appendix I. Section three gives the conclusions.

II. THE MODEL

Following Christensen, Jorgenson and Lau (1973) a translog cost function is used. The function is assumed to be non-negative, non-decreasing and positively linear homogeneous.[1] and concave in factor prices for each given produce-

[1]The cost function is homogeneous of degree one in factor prices i.e., for a fixed level of output, the total cost must increase proportionately when all prices increase proportionately. See Christenen and Greene (1976) p. 660.

ible output vector. The function is supposed to be a second degree approximation and as such symmetry applies.

The translog cost function can be presented by :

$$\log C = \alpha_o + \alpha_q \log Q + \alpha_r \log R + \alpha_w \log W + \alpha_m \log M + 1/2\ \alpha_{qq} \log Q \log Q + \alpha_{rq} \log Q \log R + \alpha_{qw} \log Q \log W + \alpha_{qm} \log Q \log M + 1/2\ \alpha_{rr} \log R \log R + \alpha_{rw} \log R \log W + \alpha_{rm} \log R \log M + 1/2\ \alpha_{ww} \log W \log W + \alpha_{wm} \log W \log M + 1/2\alpha_{mm} \log M \log M + U \quad (1)$$

Where C = total cost of production ;
Q = quantity of industrial output ;
R = index of capital rentals ;
W = index of wages in industrial sector ;
M = price index of industrial raw materials ; and
α_o, α_i, α_{ii} and α_{ij} are parameters to be estimated
where i, j = q, r, w and m.

The function is a second degree approximation and as such symmetry applies. This means :

$$\alpha_{ij} = \alpha_{ji} \quad (2)$$

This reduces the number of parameters to be estimated and thus increases the number of degrees of freedom.

Further, the assumption of linear homogeneity with respect to input prices required for a well-behaved cost function implies the following restrictions :

$$\sum_{i=r}^{m} \alpha_i = 1 \quad (3)$$

$$\sum_{i=r}^{m} \alpha_{ij} = \Sigma \alpha_{ji} = 0 \qquad (4)$$

for i,j, = r,w and m.

The cost function specified above is non-homothetic and may have non-constant return to scale. We shall call this model A. It is distinct from studies such as Uri (1979) William and Laumas (1981) in which a homothetic cost function is assumed. They have also implicitly assumed a constant return to scale which may or may not be the case.

A homothetic cost function means not only that factor prices are separable among themselves but also that factor prices and output are separable.[2] Thus as additional parameter restriction

$$\alpha_{qi} = 0 \qquad (5)$$

would be required.

The constant return to scale (Homogeneity) restriction can be imposed by

$$\begin{matrix} \alpha_{qi} = 0 \\ \alpha_{qq} = 0 \end{matrix} \qquad (6)$$

In order to examine whether the assumption of homotheticity and that of constant return to scale are realistic in the present case we impose above restrictions (equations 5 and 6) on top of the restrictions given in equations 3 and 4 and call them models B and C respectively.

Further restrictions for unitary elasticity of substitution between factors can be imposed by

$$\alpha_{ij} = 0 \qquad (7)$$

so that the function is Cobb-Douglas. The model with restrictions given in equation (7) along with models A, B and C will be called AD, BD and CD respectively.

[2]The separability may be of three types : global, strong and weak. If the coefficients of all the cross terms are zero i.e., the function is Cobb-Douglas, the separability is called global. Strong separability requires that the cross terms of the individual input be equal to zero. A necessary and sufficient condition for two inputs to be weakly separable is that the marginal rate of substitution between them be independent of the quantities of other inputs. See Turnovsky and Donnelly (1982, p. 17) also Berndt and Christenen (1973).

Whether models B and C represent the cost condition in Bangladesh manufacturing industries can be examined by estimating model A and looking at the significance of the coefficients obtained for the cross terms of Q with input prices and with Q itself. If the estimated coefficients are insignificant then the models are B and C accordingly. Similarly, one can examine whether the function is Cobb-Douglas by looking at the t-statistics for the coefficients of cross price terms. In the case of their insignificance, the models are AD, BD and CD according to whether the function was non-homothetic and non-constant return to scale, homothetic and non-constant return to scale or homothetic and constant return to scale respectively.

The above hypotheses (restrictions on model A) can also be tested by using the likelihood ratio which is given by :

$$-2 \log \lambda = N (\log | \hat{\Omega} |_r - \log | \hat{\Omega} |_u) \qquad (8)$$

where $\hat{\Omega}_r$ and $\hat{\Omega}_u$ are the estimates of the restricted and unrestricted disturbance coveriance matrix and N is the number of observations.

These statistics are asymtotically distributed as Chi-Square with degrees of freedom equal to the number of independent restrictions being imposed.[3]

A Hicks netutral technology is assumed which implies that the share equations are not affected by the technological changes, which therefore can be ignored.[4]

The Cost Share Equations

Shephard (1953) demonstrated that the share of an input in total cost can be determined in the same way as its share in the total product. This is known as the Shephard Lemma.[5] The Lemma states that :

[3]See Pyndick, R ; (1979) p. 171.

[4]See Magnus and Woodland (1980) p. 8.

[5]"Shephard's central idea is that technologies can be determined from two alternative and completely equivalent points of view: The Production Function and marginal productivities of inputs on the one hand and the Cost Function and the demand for inputs conditional on output on the other.....

Part of the duality between cost and production function is based on the equality between derivatives of the cost function with respect to price and factor demands conditional on out-put."

D.W. Jorgenson in Forward to R. W. Shephard's book *Cost and Production Function* (1953), reprinted as *Lecture Notes in Economics and Mathematical System*, Spring and Verlag, New York 1981.

$$\delta C/\delta P_i = X_i$$

where P_i is the price for input X_i.

Applying this to translog cost function we get :

$$\frac{\delta \log C}{\delta \log P_i} = \frac{\delta C \; P_i}{\delta P_i \; C} = \frac{X_i \; P_i}{C} = S_i \qquad (9)$$

where S_i is the share component of input X_i. Thus a system of n cost share equations corresponds to the translog cost function in qequation (1) above.

From equation (1), one can easily find the ratio of a particular cost component with respect to total cost. Thus the ratio of capital cost to total cost can be read from the elasticity of cost with respect to capital rental (R) :

$$S_r = \delta \log C/\delta \log R = \alpha_r + \alpha_{qr} \log Q + \alpha_{rr} \log R + \alpha_{rw} \log W + \alpha_{rm} \log M + U \qquad (10)$$

The ratio of labour cost to total cost will be given by :

$$S_w = \delta \log C/\delta \log W = \alpha_w + \alpha_{qw} \log Q + \alpha_{rw} \log R + \alpha_{ww} \log W + \alpha_{mw} \log M + U \qquad (11)$$

The share of material cost in the total cost will be given by :

$$S_m = \delta \log C/\delta \log M = \alpha_m + \alpha_{qm} \log Q + \alpha_{rm} \log R + \alpha_{wm} \log W + \alpha_{mm} \log M + U \qquad (12)$$

The parameter restrictions for linear homogeneity, for the above three share equations and for equation (1) will be as follows :

$$\alpha_r + \alpha_w + \alpha_m = 1 \qquad (13)$$

$$\alpha_{qr} + \alpha_{qw} + \alpha_{qm} = 0 \qquad (14)$$

$$\alpha_{rr} + \alpha_{rw} + \alpha_{rm} = 0 \qquad (15)$$

$$\alpha_{rw} + \alpha_{ww} + \alpha_{wm} = 0 \qquad (16)$$

$$\alpha_{rm} + \alpha_{wm} + \alpha_{mm} = 0 \qquad (17)$$

The above restrictions imply that for a given level of output, the total cost must increase proportionately to the increase in the factor prices.

The parameters of the cost function can be estimated more efficiently if the cost function and the share equations are estimated jointly. Because the share equations are derived from the cost function, they add no new parameters to be estimated. Further, joint estimation permits imposition of the restriction that a given parameter has the same value in the cost function and in the share equation. The use of this restriction is particularly important in maintaining concavity with respect to input prices for the cost function. It should be noted that the assumption of linear homogeneity in factor prices for the cost function establishes a linear dependence among the share equations. That is :

$$\sum_{i=1}^{n} S_i = 1 \qquad (18)$$

where i=r, w and m.

Since the cost shares necessarily sum to unity, the sum of the U's in equations 10, 11 and 12 must be zero at each observations and the disturbance covariance matrix is singular. Thus one equation must be dropped from the Zellner's system. Studies have shown that it does not matter which share equation is dropped.[6] It is also evident from equations 15, 16 and 17 that the parameters of any dropped equation can be estimated from the remaining equations. Thus, if we decide to drop equation 12, the remaining two equations can be re-written as follow :

Re-arranging equations 15 to 17

$$\left.\begin{aligned} \alpha_{rr} &= -\alpha_{rw} - \alpha_{rm} \\ \alpha_{ww} &= -\alpha_{rw} - \alpha_{wm} \end{aligned}\right| \qquad (19)$$

equation (11) is re-written as :

$$S_r = \alpha_r + \alpha_{rq} \log Q + \alpha_{rw} (\log W - \log R) + \alpha_{rm} (\log M - \log R) + U \qquad (20)$$

6see Barten (1969) pp. 7-73.

Equation 12 can be re-written as :

$$S_w = \alpha_w + \alpha_{wq} \log Q + \alpha_{rw} (\log R - \log W) + \alpha_{wm} (\log M - \log W) + U \quad (21)$$

Thus a Zellner's system of three equations can produce the parameters of all the equations including total cost and cost shares.

The Economies of Scale

The scale economies can be read from the elasticity of cost with respect to quantity produced. If the first derivative with respect quantity in equation (1) is less than one, the scale economies will be assumed to be existing. Similarly, diseconomies of scale will be assumed when the first derivative of equation (1) is more than one. Constant return to scale will be assumed when the elasticity is equal to one. The formula for scale economies for models A to D are presented below :

TABLE I

SCALE ECONOMIES FOR MODELS A TO D

Model A $= 1 - (\alpha_q + \alpha_{qq} \log Q + \Sigma^i \alpha_{qi} \log P_i)$

Model B $= 1 - (\alpha_q + \alpha_{jq} \log Q)$

Model C $= 1 - \alpha_j$

Medel AD $= 1 - (\alpha_q + \alpha_{qq} \log Q + \Sigma_i \alpha_{qi} \log P_i)$

Model BD $= 1 - (\alpha_q + \alpha_{jq} \log Q)$

Model CD $= 1 - \alpha_j$

Factor Substitutions

Uzawa (1962) has shown that the Allen partial elasticity of substitution between two inputs can be estimated from the following equation :

$$\sigma_{ij} = \frac{C\ C_{ij}}{C_i\ C_j} \quad (22)$$

$$\text{where } C_{ij} = \frac{\delta^2 C}{\delta P_i \delta P_j} \quad \text{and}$$

$$C_i = \frac{\delta C}{\delta P_i}$$

For the translog cost function this is given by :

$$\sigma_{ij} = \frac{\alpha_{ij} + S_i S_j}{S_i S_j} \tag{23}$$

where $i \neq j$ $\quad i, j = r, w, m$

The cross price elasticity is given by :

$$n_{ij} = \sigma_{ij} S_j = \frac{\alpha_{ij} + S_i S_j}{S_i} \tag{24}$$

The own price elasticity is given by :

$$n_{ii} = \sigma_{ii} S_i \tag{25}$$

$$\text{where } \sigma_{ii} = \frac{\alpha_{ii} + S_i^2 - S_i}{S_i^2}$$

It should be noted that in the Cobb-Douglas production function where elasticity of substitution between two factors is assumed one, the α_{ij} in equation (23) is restricted to zero.

With the above delineation of the mathematical tools, we are now in a position to estimate factor substitutability in the manufacturing industries of Bangladesh.

In the following section we present the results. The nature and the sources of the data used are detailed in Appendix 1.

III. THE RESULTS

The estimated coefficients for models A, B, C, AD, BD and CD are presented in Table II. Each model was estimated using two data sets constructed by using equations 1. 1 and 1.2 respectively for set one and two. Since the results obtained from data set two do not seem to conform to the concavity condition of a well-

behaved cost function, they are not reported in the text. Results obtained from data set one are reported and discussed below.

TABLE II

REGRESSION RESULTS OF THE TRANSLOG COST FUNCTION

Parameters	Models					
	A	B	C	AD	BD	CD
α_o	1.441 (18.68)	1.459 (19.01)	1.408 (18.95)	1.300 (19.97)	1.380 (22.45)	1.307 (22.14)
α_q	−2.514 (−1.56)	−2.140 (−1.40)	1.843 (4.00)	−3.710 (−2.42)	−5.883 (−3.97)	.360 (.87)
α_r	.119 (6.17)	.115 (6.07)	.119 (6.26)	.065 (5.32)	.049 (4.88)	.051 (5.09)
α_w	.175 (7.37)	.160 (7.37)	.165 (7.62)	.205 (17.75)	.170 (18.51)	.171 (18.70)
α_m	.707 (30.16)	.725 (33.57)	.717 (33.54)	.729 (45.37)	.781 (60.53)	.778 (60.38)
α_{qq}	18.943 (3.11)	15.780 (2.67)	—	23.520 (4.11)	25.020 (4.38)	—
α_{rq}	−.096 (−.86)	—	—	−.237 (−2.36)	—	—
α_{wq}	−.302 (−2.04)	—	—	−.456 (−5.04)	—	—
α_{mq}	.398 (3.80)	—	—	.693 (5.41)	—	—
α_{rw}	−.011 (−1.46)	−.013 (−1.73)	−.013 (−1.68)	—	—	—
α_{rm}	−.014 (−1.80)	−.014 (−2.03)	−.015 (2.24)	—	—	—
α_{mw}	−.044 (−2.40)	−.095 (−4.95)	−.106 (−5.66)	—	—	—
α_{rr}	.025 (3.57)	.027 (4.28)	.028 (4.44)	—	—	—
α_{ww}	.055 (2.61)	.108 (4.15)	.119 (5.67)	—	—	—
α_{mm}	.058 (3.62)	.109 (6.90)	.121 (27.50)	—	—	—
log $\lvert \hat{\Omega} \rvert$	−16.7385	−15.5511	−14.6002	−15.4432	−14.1206	−13.5919

*Figures in the parentheses indicate t-statistics.

From the estimates of model A, it can be observed that the t-statistics of the coefficients α_{wq} and α_{mq} are quite large, so are the t-statistics for α_{qq}. These suggest that models B and C are not consistent with the data sets used. Looking at the t-statistics again, the coefficients α_{rw} and α_{rm} do not appear to be significant but that of α_{mw} appear to be significant. This indicates that the hypothesis of unit elasticity of substitution between factors (Cobb-Douglas) may be inappropriate in the present case. This view is confirmed by the likelihood ratio test (equation 8). The relevant statistics are presented in Table III.

TABLE III

TEST STATISTICS FOR HOMOTHETICITY, HOMOGENEITY AND UNITARY ELASTICITY OF SUBSTITUTION BETWEEN FACTORS

Models	Number of Restrictions Imposed on Model A	Critical Value of $X^2_{.01}$	Estimated Value X^2
B	2	9.21	11.87
C	3	11.35	21.38
AD	3	11.35	12.95
BD	5	15.09	26.18
CD	6	16.81	31.47

Note that the estimated Chi-Square are compared with the theoretical values of $X^2_{.01}$ with degrees of freedom equal to the number of restrictions imposed upon model A. Recall also that the degrees of freedom for model A is not adversely affected by the number of restrictions imposed.[7] However, since the number of observations are only ten, the degrees of freedom are very limited. The results should, therefore, be interpreted with caution.

The computed Chi-Square of all the restricted models are higher than the theoretical values of Chi-Square at one percent confidence limit. These suggest that the null hypotheses for the parameters α_{qq}, α_{qi} (for homotheticity and homogeneity) and α_{ij} to be equal to zero are rejected.

[7]The degrees of freedom in 3SLS is the number of observations times the number of equation minus the number of parameters: where the number of parameters is total number minus the number of restrictions. (The author is indebted to Mr. K.J. White, of the University of British Columbia for making this point.)

Thus the function appears to be neither Cobb-Douglas nor ACMS (constant return to scale). It does not appear to be homothetic either. This implies that the marginal rate of substitution between factors is not independent of the quantity produced and/or of the third (or fourth) factor.

Based on the regression results the estimated cost share equations and elasticities are presented below.

Cost Share Estimates

The share of a particular input cost in the total cost has been estimated on the basis of equations 10, 11 and 12. The estimates are presented in Table IV.

TABLE IV

COST SHARE ESTIMATES IN PERCENT

1. Capital	.065
2. Labour	.146
3. Materials	.789
Total	1.000

Elasticities

As said earlier, the cost function in Bangladesh manufacturing industries does not seem to be Cobb-Douglas. As such the elasticities of substitution between two factors are not necessarily one. The estimated elasticities are presented in Table V. It may be observed that the substitution elasticities are by and large close to those obtained by Rahman (1973) in which capital and labour appeared to be close substitutes in most of the SIC industries. However, in the present study the elasticities of substitution between labour and capital and between labour and materials are not the same. The model also provides the estimates for cross price and own price elasticities of factor demand.

The above results were estimated with an assumed discount rate equal to the rate of inflation i.e., real time preference was assumed to be zero (see equation 1. 4). The estimates were not significantly different when time preference rate was assumed to be 3% per annum. Similarly, the differences in results were not significant whether a lower or a higher depreciation rate is used (e.g., $d = 3\%$ or $d = 12\%$). Further, the results were insensitive to what share equation was dropped from the system.

TABLE V

ESTIMATED ELASTICITIES : BANGLADESH MANUFACTURING SECTOR

Equation	Elasticities Estimated from Model A
(23)	$\sigma_{CL} = 1.000$
	$\sigma_{CM} = 1.00$
	$\sigma_{LM} = .619$
(24)	$\eta_{CL} = .146$
	$\eta_{LC} = .065$
	$\eta_{CM} = .789$
	$\eta_{MC} = .065$
	$\eta_{LM} = .488$
	$\eta_{ML} = .090$
(25)	$\eta_{CC} = -.550$
	$\eta_{LL} = -.477$
	$\eta_{MM} = -.137$

σ_{ij}=elasticity of substitution between factor i and j. $\sigma_{ij}=\sigma_{ji}$. γ_{ij}=cross price and η_{ij}=own price elasticity. C,L,M,=capital, Labour and Materials.

Results of the present study indicate that the manufacturing industries in Bangladesh are facing an increasing cost situation due to input price effect as well as quantity effect. This we discuss below.

Scale Economies

The scale economies pertaining to Bangladesh manufacturing industries are estimated using the formula given for model A in Table I. The cost elasticity with respect to quantity produced (first derivative of equation 1) is estimated to be

1.64. This means a one percent increase in output leads to a 1.64 percent increase in cost. A part of this increase is attributable to the increased input prices. But the major part of this increase seems to have been due to the quantity effect. Whether this can be called a scale effect is doubtful. In post independence Bangladesh many industries had to operate at a far below capacity level, (see BBS 1980, tables 5.11 and 5.12, p. 300). New firms that came into operation are only few and far between and are of smalls ize. Thus the results should be interpreted in the historical perspective of Bangladesh. It would probably be wrong to conclude from the above results that an expansion in the size of operation of the existing firms in Bangladesh will lead to an increase in cost per unit of output.

IV. CONCLUSION

A translog cost function was fitted to the data pertaining to the manufacturing industries of Bangladesh from 1969/70 to 1978/79. The inadequacy of the number of observations and the poor quality of the data used should be borne in mind when interpreting the results.

From the statistical test of likelihood ratios as well as t-values it is concluded that a model hypothesising non-unitary elasticity of substitution and non-constant return to scale is appropriate in the case of Bangladesh manufacturing industries. It appea s that the factors of production including materials are not separable among themselves nor from the quantity produced.

The manufacturing industries in Bangladesh seem to be facing an increasing cost situation. The rise in input prices is only partially responsible for this increase in cost. A more important factor seems to be the state of operation in the existing firms. We have, therefore, concluded that the estimated cost elasticity in the present case (1.64) does not reflect the scale effect though it may have reflected the quantity effect.

The estimated substitutability between any pair of inputs have very important implications on the growth possibility of the Bangladesh economy. The energy crisis of the early 1970's and the severe scarcity of capital together with the very high prices of imported raw materials raised doubts in many minds whether a country like Bangladesh has any chance to grow. The findings of the present study suggest that the cheap labour available in the country provides such a hope.

Appendix 1

THE ESTIMATED SUBSTITUTABILITY BETWEEN ANY PAIR OF FACTORS

We require data on the total cost of production, quantity produced and prices of capital, labour and materials used. The time span considered is ten years since 1969/70.

Among the four sets of data required, the estimation of the price of capital service and the share of capital in the total product is by far the most difficult and controversial. In measuring capital stock for the present sutdy, we have followed two established methods. First, the perpetual inventory method pioneered by Goldsmith, (see Garland and Goldsmith 1959, pp. 323-64). The method is represented below.

$$K_t = I_t + (1-d)\, K_{t-1} \qquad (1.1)$$

where K_t = Capital stock at the year t ;

I_t = volume of insvestment during year t ;

d = depreciation rate.

The main difficulty with the perpetual inventory method lies in getting started, (see Clark 1970, p. 451). However, if one can go far back in the past, any reasonable amount of stock is good to start with. After all, the starting stock is likely to be consumed up before long due to the process of depreciation. For the present study, following Magnus (1979), the depreciation rate is assumed to be 6% per annum.

The second method of measuring the value of capital service is ;

$$VCS = VA - VL \qquad (1.2)$$

where VCS = value of capital service per year ;

VA = industrial value added per year ; and

VL = employment cost for manufacturing industries per year.

Needless to emphasise that this second method includes all the system noise and produced very poor results in some studies such as Turnovsky and Donnelly (1982).

The price of capital has been estimated on the basis of the formula employed by Christensen and Jorgenson (1969) which is reproduced below.

$$PK_t = (P_{it})r + (P_{it-1})d - (P_{it} - P_{it-1}) \qquad (1.3)$$

where PK_t = price index of capital service at time t ;

P_{it} = price index of investment goods at time t ;

r = rate of discount ; and

d = depreciation rate.

The last term of the right hand side of the above equation stands for the capital gains, if any. In the present study, we assume, for simplicity, that the entrepreneurs in Bangladesh ignore capital gain when they decide to purchase a capital good and as such this term is dropped.[8]

The discount rate has been estimated by applying the following question.

$$(1+r) = (1+i)(1+\dot{p}) \qquad (1.4)$$

where r = discount rate for period t ;

i = time preference rate (constant over time) ; and

$\dot{p}$ = rate of inflation.

The price of building materials has been used as a proxy for the price index of investment goods. This as well as price index of industrial raw materials, wage index and the CPI are obtained from the *Bangladesh Statistical Yearbook 1980*. The index of the quantum of the industrial output is also obtained from the same source.

The nature and sources of the data are detailed below. Note that all the data are yearly data.

[8]When including the capital gain term Magnus (1979, p. 422) obtained a highly volatile value of PK , which was considered to be implausible.

TABLE VI

THE DATA USED FOR THE COST MODEL : BANGLADESH MANUFACTURING INDUSTRIES

Year	Capital Stock in Billion Taka	Price Index of Investment Goods 1978/79 =1.00	Price of Capital Service	Price Index of Materials	Price Index of Labour	Value of Materials in Billion Taka	Value of Labour in Billion Taka	Value of Capital Service in Billion Taka	Quantum Index
	1	2	3	4	5	6	7	8	9
1969/70	2.224	.182	—	1.000	1.000	1.927	.443	.044	1.00
1970/71	2.368	.191	.019	1.060	1.070	1.905	.520	.045	1.00
1971/72	1.537	.219	.021	1.128	1.100	1.189	.458	.033	1.00
1972/73	1.855	.316	.196	1.198	1.340	1.717	.499	.364	1.05
1973/74	1.764	.534	.150	1.272	1.610	3.866	1.32	.265	1.00
1974/75	1.673	.975	.383	1.354	1.930	7.381	1.49	.641	.98
1975/76	1.595	1.116	.082	3.525	2.050	11.14	1.77	.131	1.05
1976/77	1.537	.980	.025	6.450	2.220	12.45	1.79	.038	1.14
1977/78	1.498	.989	.239	5.211	2.510	19.73	2.26	.358	1.25
1978/79	1.483	1.00	.152	6.957	3.180	28.00	2.89	.225	1.32

Source :

Column One : Capital Stock (KT)

Figures upto 1972/73 have been taken from table 5.23 *Bangladesh Statistical Yearbook (BBS)* (1980) p. 312. For subsequent years, public and private investment figures were obtained from *Draft Second Five Year Plan* (SFYP) of Bangladesh, p. 1-22 to 23 and IX-6 respectively. These were deflated using the price index for building materials given in table 10.19 BBS (1980, p. 442). The deflated investment was then added to the stock of capital with an assumed depreciation rate of 6% per annum on the diminishing balance principle (see Clark 1970, p. 451).

Column Two : Price Index of Investment Goods (PIT)

This index has been constructed from table 10.19 BBB (1980) p. 442. (see Field and Grebenstein, 1980, p. 212 for the procedure).

Column Three : Price Index of Capital Service (PKT)

This index is constructed using equation X.3

The rate of discount has been equated to the rate of inflation and the rate of depreciation has been asusmed to be 6% per annum. The inflation rate has been calculated from table 10.23 BBS 1980, p. 446.

Column Four : Price Index of Industrial Materials (PM)

This index has been taken from table 10.2 BBS (1980) p. 431. Figures for 1971 to 1973 are estimated assuming a constant growth rate of 6.2 per annum.

Column Five : Price Index of Industrial Labour (PL) has taken from BBS (1980) table 10.23, p. 556.

Column Six : Value of Raw Materials Used (VM)

Figures for the years from 1969/70 to 1976/77 are taken from table 5.24 BBS (1980) p. 315. Figures for the subsequent two years are estimated by multiplying the quantum index with that of the industrial raw materials (column 4).

Column Seven : Value of Labour Input (VL)

Figures for the years from 1969/70 to 1976/77 are taken from table 5.21 BBS (1980) pp. 310-1. Those of the subsequent years are estimated. The price index of labour has been multiplied by the employment index in major industries. (see BBS, 1980, table 5.10 p. 299).

Column Eight : Value of Capital Service (VK) has been calculated multiplying column one by column3

Column Nine : Quantum Index (Q) has been taken from table 5.2 BBS (1980) p. 278.

The total cost (TC) has been equated with the sum of col. 6, col. 7 and col. 8.

The statistical characteristics of the data used are furnished below.

Variable Name	No.	Mean	Standard Deviation
KT	7	1.7012	0.28010
PIT	5	0.70237	0.38179
PKT	17	0.12252	0.14199
PM	8	3,1283	2,4695
PL	9	1.8900	0.69480
UK	18	0.20406	0.23442
UM	11	9,7089	9,2295
UL	10	1.4420	0.84500
Q	12	1.0878	0.12276
TC	19	11.355	10.061

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Notes and Comments

Is There a Draught Power Constraint on Bangladesh ?— A Comment on Gerard J. Gill's Article

by

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I. INTRODUCTION

Animal is the main source of power used in cultivation in Bangladesh. But recently there has been a growing concern about the alternatives to it. The questions that need to be resolved in this respect are: (a) whether there is a draught power constraint and its nature (b) whether mechanised land preparation is a suitable alternative to it and if not (c) what are the other possibilities ?

In a recent article, Gill (1981) discusses these issues and attempts to find out whether draught power is in fact a binding constraint on raising farm output to levels indicated in the Second Five Year Plan of Bangladesh. Then he provides us with a useful criticism against mechanisation as the possible solution. He also suggests alternative policy prescriptions to ease the constraint.

But our contention is that, contrary to what the title of his paper suggests, he does not really judge the existence of the constraint. He seems to assume that there is one, and his discussion in this respect is inadequate. In the next section we shall point out this inadequacy and present some data to reveal the nature of the problem. Then we shall try to supplement it with policy suggestions that follow from the nature of the problem.

II. THE NATURE OF THE DRAUGHT POWER CONSTRAINT

Gill rightly argues that the meaningfulness of a constraint depends on its relationship with the objectives aimed at. To achieve the acceleration of food production, as envisaged in the Second Five Year Plan of Bangladesh, we need to raise land productivity. The other objective of the plan, with respect to agriculture is to expand the opportunity of gainful employment. The author elaborates why

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mechanisation as a solution to the draught power constraint is inconsistent with these objectives. But the first concern should be how this constraint works as an obstacle to the achievement of these objectives.

Gill asserts that the draught power constraint in this country is not in terms of an absolute shortage of the number required but the deficient quality of the animals. He gives the figure of 3.8 acres of land to be worked by each pair of animal whereas 4 to 5 acres can be managed by each pair. There has been a variety of estimates of livestock population, with questionable reliability (Jabbar 1980). Gill does not give the source if this information. Jabbar quotes some sources which give something around 4 acres per pair. BBS (1981) presents data which shows the constraint to be more stringent. It gives the figure of 5.6 acres per pair which is high enough to suggest that the livestock population is indadequate.[1] So at least according to some of the official statistics, livestock is in short supply even in terms of number. This source states the situation as unchanged between 1960 and 1977, the acres covered by a pair being the same 5.6.

Who Face the Constraint of Draught Power Shortage ?

It is obvious that not all farms will possess livestock, in this situation of absolute shortage. According to the author those one-third households who do not possess farm animal, do face a constraint, even if there is no absolute shortage in the number of animals. Related to this is the question of whether it is the small farmers or the large ones who suffer from this inadequacy of power animals.

TABLE I

FARM-SIZE WISE SITUATION OF THE LIVESTOCK CONSTRAINT

Size of Farm Holding (acres)	% of Farm Having Cattle	Average Area per Pair of Working Animal
Small (.01 to 2.5)	73.39	4.0
Medium (2.5 to 7.5)	94.56	5.8
Large (7.5 and above)	96.78	7.7
All Holdings	**84.25**	**5.6**

Source : BBS 1981.

[1] Jabbar (1980) quotes an FAO publications namely, 'Livestock and Draught Power Development.' Working Paper V, Govt. of Bangladesh and FAO/UNDP mission, Dacca 1977 (mimeo.), which gives the estimate that an average pair of animal can cover 4 acres. It is conceivable that a specially healthy pair could have managed 6 acres. But it is the larger farms who possess such healthy animals and the acreage to be covered per pair is even more in this group (7.7 acres).

The above table shows that a larger percentage of small farmers are cattle-less. But the area covered per animal is smaller than on large holding. They will obviously be able to achieve a higher land productivity than the large farmers. In fact the observed higher land productivity of the small farmers, as revealed by many studies in India and Bangladesh (Hossain 1977), is explained by larger human and animal power input. Thus animal power shortage affects more adversely the larger farmers. A higher average of cattle among this group would not only raise productivity but also would generate employment for hired labourers, both for maintaining the animal and to provide complementary human power to apply the animal power on the field.

Over the years, the situation is deteriorating for this group as shown below :

TABLE II

SITUATION OF WORK ANIMAL SUPPLY OVER THE PERIOD 1960-1977 FOR DIFFERENT FARM SIZES

Size of Farm Holding (acres)	Average Area per Pair of Working Animal (in acres)		
	1960	1977	% of Change
Small (0.01-2.5)	4.2	4.0	—4.8
Medium (2.5-7.5)	5.5	5.8	5.5
Large (7.5 and above)	7.0	7.7	10.0
All Holdings	**5.6**	**5.6**	**0.0**

Source : BBS 1981.

There is need to show concern for this problem because this group operates a major part of the farm area.

The problem of the small farmers who do not own any work animal is no less important though they operate a small percentage of farm area. They have to hire this service and this will lead to application of smaller amount of animal power. They are compelled to use hired labour even if they do not have means to do so, and they themselves are underemployed.

Regional Difference in Availability of Animal Power

Not all areas are equally constrained by this shortage. As revealed by Table III some districts have a reasonable ratio of acreage per pair. Others are deficient,

TABLE III

DISTRICTWISE SITUATION OF DRAUGHT POWER SUPPLY AND THE EXTENT OF MECHANISED LAND PREPARATION

Districts	Area (acres per pair) of Working Cattle	Area (hundred acres) under Mechanised Cultivation
Chittagong	2.92	65
Comilla	3.32	60
Tangail	3.44	11
Dhaka	3.62	51
Bogra	3.74	12
Mymensingh	3.82	33
Pabna	3.84	8
Khulna	3.96	37
Rajshahi	3.98	103
Dinajpur	4.30	11
Sylhet	4.50	41
Jamalpur	4.54	11
Noakhali	4.74	60
Bakerganj	4.76	160
Patuakhali	4.82	4
Jessore	4.84	18
Kushtia	4.86	11
Faridpur	4.94	27
Ctg. Hill Tracts	5.40	0
Rangpur	7.86	30

Source: BBS 1981.

Any policy package to improve the situation must take this fact into account. That this has not been done in the past is revealed by the fact that acreage under mechanised

land preparation (which is the result of deliberate government intervention) does not correspond to the fact of draught power shortage.

III. PROBLEMS ASSOCIATED WITH MECHANISATION AS A SOLUTION TO THE CONSTRAINT

The author shows that tractor-use for land preparation displaces labour directly and indirectly although the magnitude of displacement of labour is not alarming, because land preparation accounts for a minor part of casual labour use.

But since tractor-use does not raise productivity significantly it is not worthwhile to displace even the small amount of labour. Neither do they increase the timeliness of planting which could indirectly raise productivity and cropping intensity. But this seems to be due to the inefficiency in the management of tractor services. So we should not discard the usefulness of tractors from this angle. If an efficient use could increase timeliness, we should suggest raising the efficiency. It seems that a real justification for not using tractors lies in the opportunity cost of doing so. It is true that the foreign exchange saved would enable us to increase the use of fertilizer, irrigation etc. and thus raise output. But this suggestion misses the very issue that is being discussed, namely that of the nature of draught power constraint.

Now let us elaborate on this issue. It is apparent that in the present situation, greater use of current inputs will help to raise output. But if we look beyond the short run impact, the position may be different. After some expansion, specially with the use of HYV *boro* and irrigation to raise productivity through higher cropping intensity the availability of draught power may prove to be a constraint. This is because of the fact that a rise in cropping intensity means that the existing animals have to work more intensively. When the animals are already weak (Jabbar 1980) overwork will further impair their health and aggravate the draught power problem in the longer run. It is difficult to estimate this cost. Otherwise the proper method of deciding whether to invest in alternatives to draught animal or on current inputs would be a comparison of benefit-cost ratio in these two forms of investment. In the absence of such rigorous analysis, we can say that emphasis on current inputs should be supplemented by measures to improve the draught power constraint, relieve them from overwork and thus to improve their health to avoid a bottleneck in future.

IV. SHOULD WE PROCEED WITH MECHANISATION OF AGRICULTURE ?

The above argument should not be taken to mean what we are suggesting a large scale mechanisation to solve the problem of animal power supply. Nor

do we agree with the author that the shortage should be responded by reducing demand by introducing the 'no tillage' system. This will not only affect productivity but also, like tractor ploughing, reduce labour requirement.

So a sensible policy should be to adopt measures to increase the supply of livestock. In the short run, selective mechanisation may help not only to overcome the shortage of livestock, but will help to remedy the shortage by relieving the animals from overwork and improving thair health. To meet shortage in specific regions, it may be easier for the government to intervene by providing tractors for hire service. Mechanisation can and should be used only as a supplementary measure, the long term objective being the provision of adequate draught power.

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Is There a Draught Power Constraint on Bangladesh Agriculture ? —A Reply

by

Gerard J. Gill*

It is seldom that an author has the benefit of such a lengthy and thoughtful comment as that offered by Rahman. It is also most encouraging that the conclusions she reaches differ so little from my own, despite the differences in our perspectives. In offering this reply I would like to clear up a number of misunderstandings which seem to have crept in—quite possibly due to inadequacies in the original presentation. It should be borne in mind, however, that the article in question was only a brief summary of a quite lengthy (248 page) report to which the reader was referred in the first footnote.

The Nature of the Draught Power Constraint

Rahman's first point of substance is that I "seem to assume" that there is a draught power constraint without adequately discussing the question. Such a constraint is, however, unquestionably faced by the 37 per cent of farmers in our sample (15.75 per cent nationally, according to the BBS figures Rahman quotes) who have no draught animals and who therefore have to wait until others have finished ploughing before they can hire in animals. Rahman and I are therefore basically in agreement that there is a draught power constraint —however defined. I have defined it in terms of quality and distribution of animals, whereas Rahman argues that the actual number is also insufficient. The source of my average—3.8 acres per pair of draught animals—which she questions, is the intensive survey on which the article is based. It is interesting that Jabbar arrived at a similar figure, of 4 acres per pair. Rahman apparently rejects this evidence as being of 'questionable reliability' while at the same time evidently accepting the "official" estimates contained in the Agricultural Census. This shows a perhaps unwarranted faith in official statistics. The Census was a cross-sectional survey based on single interview, long-recall methods, whereas the figures Rahman rejects were based on multi-interview techniques. For example, in the survey reported in the original article the

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same panel of farmers was interviewed by closely supervised village-resident enumerators every week for up to 15 months. Why, then, are these figures to be regarded as less reliable than Census data ? It certainly cannot be argued that the latter figures are more reliable because the sample was large. Inaccurate figures do not become accurate merely by replicating the collection process on a large scale. Livestock statistics are notoriously difficult to collect in a "one-off" survey—partly because, as a forthcoming study by Mahfuzul Huq will show (Huq 1984), illegal activities shuch as smuggling and theft are very common in this sector and information is correspondingly sensitive and difficult to obtain. Before accepting official statistics too uncritically, it would be worthwhile also to read Pray's article on the subject in an earlier issue of this journal (Pray 1980).

Who Faces the Constraint ?

Rahman's argument that if smaller farmers have a higher number of animals per acre than larger ones (her Table I) then "they will obviously be able to achieve a higher land productivity than larger farmers" is misleading for two reasons. First, smaller farmers tend to have smaller, weaker animals and use a relatively high proportion of cows for draught purposes (Jabbar 1980; Gill 1981). Thus in terms of "installed horsepower", as distinct from number of animals, per acre the difference is less than that suggested by Rahman's Table I. Second, because of the "lumpiness' inherent is livestock ownership, some smaller farmers have excess draught capacity, which they hire out. Thus it is not necessarily true that smaller farmers use more draught power (as distinct from animals) per acre *on their own farms* than larger ones.

Rahman's observation that relatively higher land productivity among smaller farmers can be explained in terms of higher per acre human *and* animal input, is also to some extent misleading. While the positive relationship between labour input and land productivity does hold true (and this was shown in the Survey originally reported (Gill 1981), there is no clear evidence that it is also true in the case of animal draught inputs. This is partly so far the reasons stated above. Higher labour intensity on small farms tends to manifest itself in more labour for weeding and harvesting, tasks which for the most part do not require animals.

The conclusions Rahman draws from her Table II are frankly puzzling. The data are too crude to support the conclusions drawn. The reader may well ask whether he is seriously expected to believe (a) that the average situation as regards draught power has actually improved for the smallest farmers and deteriorated for the medium and large farmers over the period 1960 to 1977 and (b) that while the smaller, and presumably therefore poorer, farmers can afford an average of 4.2 acres/pair, the larger farmers cannot afford this level.

Regional Differences

There are, as Rahman rightly observes, regional differences in draught power availability and policy must take these into account. The original Survey covered sampling areas ranging from Rangpur to Noakhali and did note such differences—although they were not as great as the numbers quoted in Rahman's Table III suggest (Gill 1981).

Problems Associated with Mechanisation

While it is true that the problem of direct labour displacement associated with mechanisation was not found to be serious, it is quite untrue that this was also the case for indirect labour (i.e. smallholder) displacement (resulting from a tendency for mechanised farms to become larger). This provides a major incentive for mechanisation—together with the fact that sales of tractors and power tillers, as well as government tractor hire services, have always been heavily subsidised by the taxpayer in Bangladesh. The reason that power tillers (which are in the private sector and are efficiently managed) do not increase timeliness is not poor management but, as explained in the original article, the need to cover a bigger area to justify the much higher investment costs compared with draught animals. Another problem is difficulty in procuring clean fuel and lubricants, quality spares and competent mechanics in rural areas.

Apart from the negative indirect employment effect, the justification for rejecting tractors and power tillers is the opportunity cost, as Rahman rightly says. She is not, however, correct in asserting that to raise the issue of opportunity cost of foreign exchange "misses the very issue that is being discussed". To put the argument differently (in terms closer to the "rigorous cost-benefit analysis" of alternatives which Rahman would like to see), what was orignially argued was that, quite apart from any considerations of equity, the marginal physical return to investment of the nation's scarce foreign exchange resources in fertilizer is much higher than the alternative of investing these resources in tractors and power tillers. It is in this sense that shortage of fertilizer can constitute a greater constraint on agricultural productivity than shortage of draught power. Of course, over the long term as fertilizer use increases its marginal physical product will tend to fall. Ultimately we may reach a point at which investment in tractors and power tiller produces higher returns than any alternative. If and when that happens it will be time to re-examine the issues. It was not intended to suggest that Bangladesh must never under any conceivable circumstances invest in tractorisation.

It is incidentally, fallacious to argue that higher cropping intensity necessarily requires that animals "have to work more intensively". What is more likely to happen is that the same animals have work to do during a greater number of seasons in a

year—which implies not harder work but greater capacity utilisation, and hence a more efficient use of the investment. Moreover where cropping intenstiy increases, production of crop residues—and hence livestock feed—also tends to increase, so that the draught power situation can actually improve with greater cropping intensity, given the same number of animals, because they can be better fed. Where there could be a problem is where a new more intensive cropping system requires very fast turnaround between successive crops. This has always been the case with the traditional b.*aus* — t.*aman* pattern in Bangladesh. The survey in question showed, however, that under farmer's field conditions in Bangladesh tractorisation (including power tillers) did not reduce the turnaround period between such crops—for the reasons stated earlier.

Should We Proceed with Mechanisation ?

Rahman argues that "sensible policy should be to adopt measures to increase the supply of livestock". I have no argument with that except to substitute "animal draught" for "livestock", since the same amount of power can be obtained at lower cost with a relatively small number of well fed animals than with a relatively large number of half-starved beasts. However she goes on to argue for selective mechanisation through a government tractor hire service in the short term to meet the present shortage. She should know that the government tried precisely this strategy through the BADC Tractor Hire schemes under the Mechanised Cultivated Division, a scheme which was abandoned a few years ago because it was hopelessly uneconomic, failing to cover even its running costs. Moreover, as an in-depth evaluation has shown, the Scheme benefited not the poorer farmers but the larger ones (those with political and economic influence) are their clients (Mettrick and James 1981).

Finally I should say a word in defence of "zero" or "minimum" tillage systems. These will not eliminate the need for draught power but will reduce it—for certain crops in certain seasons. If draught power is in short supply—as is the case for farmers who have no animals—this is a very important consideration. Moreover labour for cultivation is not typically provided by the poorest group, the landless labourers, since they have no draught animals. Bangladeshi farmers do not tend to entrust their valuable draught animals to strangers who might maltreat them. Thus it is either family labour or that of other farmers who have excess ploughing capaciiy which will be displaced by zero and minimum tillage, and obviously in terms of income distribution at least, that particular form of labour displacement is relatively harmless.

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